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INTERNATIONAL CLINICS:

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ON

MEDICINE, SURGERY, GYNÆCOLOGY, PEDIATRICS,
NEUROLOGY, DERMATOLOGY, LARYNGOLOGY,
OPHTHALMOLOGY, AND OTOTOLOGY,

BY

PROFESSORS AND LECTURERS IN THE LEADING MEDICAL
COLLEGES OF THE UNITED STATES, GREAT
BRITAIN, AND CANADA:

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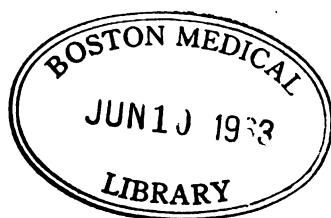
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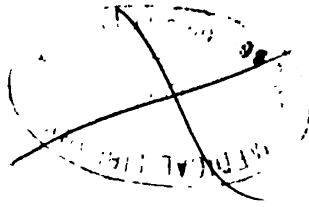


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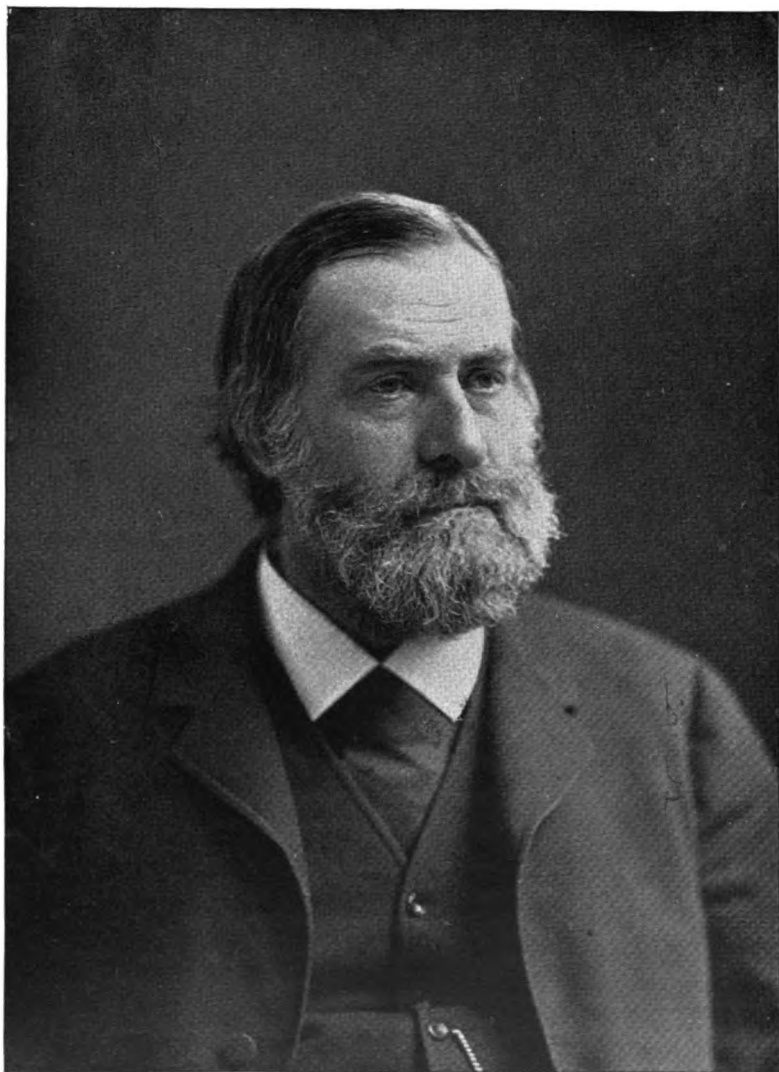
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JOSEPH LEIDY, M.D.

John H. ...

I have been thinking about you a great deal lately, and wondering how you are getting on. I hope you are well and happy. I have been very busy lately, but I always find time to think of my friends. I would like to hear from you soon. Please write when you have a chance. I am sure you will have many interesting things to tell me. I am looking forward to hearing from you again.



BIOGRAPHICAL SKETCH

OF

JOSEPH LEIDY, M.D.

ON April 30, 1891, after a brief illness, died, at his residence in Philadelphia, Dr. Joseph Leidy, one of the most eminent of American anatomists and scientists. It is our purpose in this review to give a brief sketch of the life and work of this distinguished man.

Dr. Leidy was born in Philadelphia, September 9, 1823, and made that city his place of residence during life. His early education was acquired from private tutors and schools in the vicinity of his native city, and in 1840, at the age of seventeen, he began the study of medicine in the Medical Department of the University of Pennsylvania, his preceptors being Drs. James McClintock and Paul B. Goddard. He had early shown ability in drawing, and the intention of his parents at first was to make him an artist, but his marked inclination towards the study of natural history induced a change of plan, and at the suggestion of his mother the study of medicine was undertaken. He graduated in 1844, his thesis being an essay on the "Comparative Anatomy of the Eye of Vertebrated Animals."

Soon after his graduation he became an assistant to Dr. Hare, professor of chemistry in the University, and in 1845 was appointed by Dr. Horner—who then filled the chair of anatomy—prosector in anatomy, a field of work to which his tastes strongly inclined him. He now gave up the practice of his profession, which he had followed since his graduation, and resolved to devote himself thenceforth to scientific teaching and anatomical study, to which he was led by strong native tendencies. In 1846 he was elected demonstrator of anatomy in the Franklin Medical College, but in the following year severed his connection with this institution, and again became associated with Dr.

Horner at the University of Pennsylvania, giving private courses of anatomical lectures to his students and others.

In 1853 he succeeded Dr. Horner as professor of anatomy, a chair which he filled during the remainder of his life, and to which was added, a few years before his death, that of zoology and comparative anatomy. In 1871 he was elected professor of natural history in Swarthmore College, which position he filled in conjunction with his university duties until a few years ago, when increasing labors, and the desire to devote more time to original research, induced him to resign it. In addition to these duties, Dr. Leidy held the offices of president of the Academy of Natural Sciences of Philadelphia from 1880 until his death, and of president of the faculty of the Wagner Free Institute of Science from the date of the reorganization of that institution. He had been officially connected with the Academy of Natural Sciences, as chairman of its board of curators, from 1846.

These official and professional duties of Dr. Leidy were accompanied by an extraordinary series of private scientific investigations, and by very numerous published accounts of the results of his varied studies, which gave him an exalted position in the field of science, and a fame which can only be described as world-wide. Never content with presenting to students the results attained by other investigators, every moment available from his professional duties was given to the study of nature, his observations being made with a keen acumen, his drawings of the minute forms and tissues of life performed with remarkable skill and correctness, and his written descriptions possessing a clearness and perspicuity that gave unusual value to all that came from his hand, his fellow-workers quickly perceiving that the work of Dr. Leidy rarely needed to be repeated. It is questionable if any scientist of equal industry ever lived who is responsible for as few errors of observation and description as this distinguished observer.

The labors of Dr. Leidy were so numerous, and extended over so broad a field of investigation, that the most we can undertake to do is to give a very brief statement of their scope,—a statement which must principally be confined to a mention of the titles of his published papers. These, embracing his elaborate books and memoirs and his contributions to scientific periodicals, include over a thousand titles in all, varying from works of exhaustive completeness to very numerous records of minor observations published in the "Proceedings" of scientific societies.

Returning to take up the record of his scientific life, we find that, in addition to his graduation thesis, he was the author of several im-

portant papers on biological subjects during his student-life, and in the year of his graduation contributed a valuable chapter to Binney's "Terrestrial Mollusca of the United States." His early scientific studies were confined to no specialty, but extended over the whole domain of nature, and though he wrote little or nothing on mineralogy and botany, his knowledge of both these subjects was almost that of a specialist. The "Proceedings" of the Academy of Natural Sciences of Philadelphia for 1845-46 indicate, however, that his favorite field of research during this period was among the lower forms of animal life. In rapid succession appeared papers on "New Species of Entozoa," "The Mechanism which closes the Wings of Grasshoppers," "The Situation of the Olfactory Sense in the Gasteropods," and "New Species of Planarian Worms." In 1846 he recorded an observation of the utmost practical importance, that of the occurrence of a species of trichina in the hog, which seemed to him identical with that which Owen had discovered in the muscular tissue of man, and which he had himself afterwards found in human tissues in the dissecting-room of the University. Leuckart afterwards acknowledged that he was indebted to Leidy's communication for his subsequent success in tracing the development of *trichina spiralis* in man and the hog.

During the subsequent four years Dr. Leidy, though actively engaged in another field of biological study, continued his observation of minute forms and tissues, his investigations and published papers during this period embracing studies in the development of cartilage-cells, the structure of the liver, the nettle organs in hydra, with descriptions of many new forms of entozoa, miscellaneous anatomical and zoological notes, and a continued series of articles entitled "Helminthological Contributions." In the same period appeared his beautifully-illustrated monograph, published by the Smithsonian Institution, entitled "A Flora and Fauna within Living Animals," and his elaborate memoir on the anatomy of the *Corydalis cornutus*.

The other field of biological study of which we have spoken was that of palæontology, which rose about this period into absorbing interest through the discovery of numerous remains of extinct animals in the western Territories. Dr. Leidy was the first in the field in the study of this material, of priceless value in the investigation of the development of living forms, and the striking results of his observations quickly gave him a European reputation, and laid the broad foundations of his future fame. In 1847 appeared his first paper in this new field of study, that entitled "The Fossil Horse in America." It was followed from time to time by a monumental series of similar contri-

butions to palæontological science. "The Ancient Fauna of Nebraska" appeared in 1853, "Memoir on the Extinct Sloth Tribe of North America," in 1855, "Cretaceous Reptiles of the United States," in 1865; and in 1869, "Extinct Mammalian Fauna of Dakota and Nebraska," which was published as the seventh volume of the "Journal" of the Academy of Natural Sciences. This elaborate work was the result of a gradual accumulation of materials during twenty-three years. It was followed in 1873 by one of equal importance, under the title "Contributions to the Extinct Vertebrate Fauna of the Western Territories."

For many years after the publication of his paper on the Fossil Horse, Dr. Leidy was almost the only American scientist whose attention was directed to the study of the extinct vertebrata, and his work in this direction, in view of his lack of facilities for labor in the field, was surprisingly great. We need scarcely say that it was marked by his usual great accuracy, and that it called the general attention of palæontologists to its author, who, from his study in the halls of the University, was turning out such remarkable memoirs. The wonderful remains brought to light by the exploration of the United States Geological Survey under Dr. Hayden had, however, excited the interest of others, and private expeditions as well as official surveys had collected rich stores of vertebrate fossils, in some cases from the same localities whence came the material submitted to Dr. Leidy's examination. The anxiety to obtain early publications of the description of supposed new forms became so great that in at least one instance such description was telegraphed to a learned society from the field. The despatch was published with as little delay as possible, but the paragraph contained so many errors that the experiment has not, it is believed, been repeated. In the attempt to settle questions of priority, the published arguments became so bitter, and the personalities indulged in so pronounced, that Dr. Leidy, who had been able to refrain from taking part in the controversy, finally withdrew from the field. His only palæontological contributions of importance, later than those above mentioned, were descriptions of vertebrate remains chiefly from the phosphate beds of South Carolina, and more recently studies of the fossil rhinoceros and other extinct animals found in Florida.

Returning now to his original field of study, which, indeed, he had never ceased to prosecute, Dr. Leidy prepared and gave to the world, in 1879, his "Fresh-Water Rhizopods of North America," a monumental example of industry, which many naturalists regard as his greatest and most useful contribution to science. This work, pub-

lished under the auspices of the government, and profusely illustrated by drawings of microscopic animals made by his own hands, is largely exhaustive, and alike in description and illustration is marked by that extreme care and clear power of seeing and reproducing which are characteristic of all that came from the hands of this great naturalist. It involves the results of many years of laborious observation in the minute fields of life, and has that merit of accuracy and faithfulness which is so characteristic of all work done by Dr. Leidy, that almost nothing which passed through his hands will need to be done over again.

To the days of his last brief illness Dr. Leidy's characteristic industry remained unabated, and in his capacity as president of the Academy of Natural Sciences, he almost weekly contributed to the "Proceedings" of that institution some scientific observation of interest and value, these contributions covering every field of biological science and including mineralogy in their scope.

Dr. Leidy passed away as he had often wished that he might, suddenly, and with his shoulder to the wheel. Nature made him a student and investigator, and never did he permit himself to forget his birthright. By turns he devoted himself with unflagging energy to the study of mineralogy, botany, medical anatomy, palæontology, microscopic zoology, and kindred biological subjects, giving his attention to each in turn with as great an earnestness as if it had been the single purpose of his life. His career was extraordinary in its tireless activities, its accomplished results, and the immense variety of its contributions to science, and the treasury of scientific truth will ever be the richer that Leidy lived and worked.

But the higher splendor of this life-work to us as Americans, that which ennobled and, it may be reverently said, sanctified its labors, was the spirit of self-abnegation, the spirit that could throw aside professional and intellectual pursuits to serve as a volunteer surgeon in one of our city hospitals in the crisis of the war-time. He was free from all desire for the rewards, the honors, and the recognition for which lesser men strive. It was the love of truth, rather than the thirst for gain or reputation, that ever moved him. And in his dealings with his fellow-men his most marked characteristic was that unvarying kindness and gentleness of disposition which prevented him from ever using a harsh word, and caused all who knew him personally to love and esteem him as a man as greatly as they admired him as a scientist.

By a singular coincidence, the death of Professor Leidy followed within twenty hours that of his eminent but less distinguished

brother, Dr. Philip Leidy. He left to mourn his loss a widow and an adopted daughter, for whose future support labors which would have made millionaires of less unselfish men had gathered but a modest competence, Dr. Leidy during his whole life having had, like the no less eminent Agassiz, "no time to make money." Professor Lesley, in concluding a tribute to his departed friend and fellow-scientist, says: "The life of Joseph Leidy may some day be written, but there can never be more than a colorless sketch of it, from which his fine personality has mainly evaporated. This is the fate of the greatest masters in science. The pyramid conceals the Pharaoh. Early in life he discovered the true function of the liver in animal life, and this placed him side by side with Harvey, the discoverer of the circulation of the blood. In middle life his discovery of the world of extinct vertebrate forms in the western region of this continent made him the peer of the great Cuvier. His years of study of the infusorial forms rivalled in wealth of new and wonderful knowledge those of Ehrenberg. What must we think of the man who was Harvey, Cuvier, and Ehrenberg combined?"

The following is an incomplete list of the honors conferred on Dr. Leidy by the prominent scientific societies of the world: The Walker prize, \$1000, from the Natural History Society of Boston. The Sir Charles Lyell medal, from the Royal Geological Society of London, in recognition of his valuable contributions to palæontology. The Cuvier medal, from the French Academy of Sciences, for his work in biology. The degree of LL.D., from Harvard University, in 1886. Presidency of the Academy of Natural Sciences, and of the Wagner Institute of Science, and membership in the American Philosophical Society, and other scientific institutions of Philadelphia. Honorary membership in the following societies of science: The Natural History Society of Boston, 1845; New York Academy of Sciences, 1848; Hesse Natural History Society, Bonn, 1848; American Academy of Arts and Sciences, 1849; Biological Society of Paris, 1851; Moscow Imperial Society of Naturalists, 1852; Mons Society of Science, 1854; Elliot Society of Natural History, S.C., 1855; St. Louis Academy of Sciences, 1856; Zoological Society of London, 1857; Imperial Leopold Carolian Academy, 1857; Munich Royal Academy of Sciences, 1858; Bohemian Academy of Sciences, Prague, 1860; Zoological and Botanical Society of Vienna, 1861; Economical Agricultural Academy, Florence, 1861; Geological Society, London, 1863; Natural History Society, Dublin, 1863; National Academy of Sciences, 1863; Essex Institute, Massachusetts, 1866; Linnæan Society, London, 1872; Anthropological Society, Lon-

don, 1862; Cherbourg Natural Science Society, 1873; Natural History Society, Mexico, 1874; Liverpool Philosophical Society, 1877; Biological Society of Washington, 1884; Copenhagen Society of Sciences, 1886; Lyceum of Natural History, New York; University Zoological and Botanical Society, Dublin; Royal Society of Dublin; Society of Naturalists of Rome, etc., etc., etc.

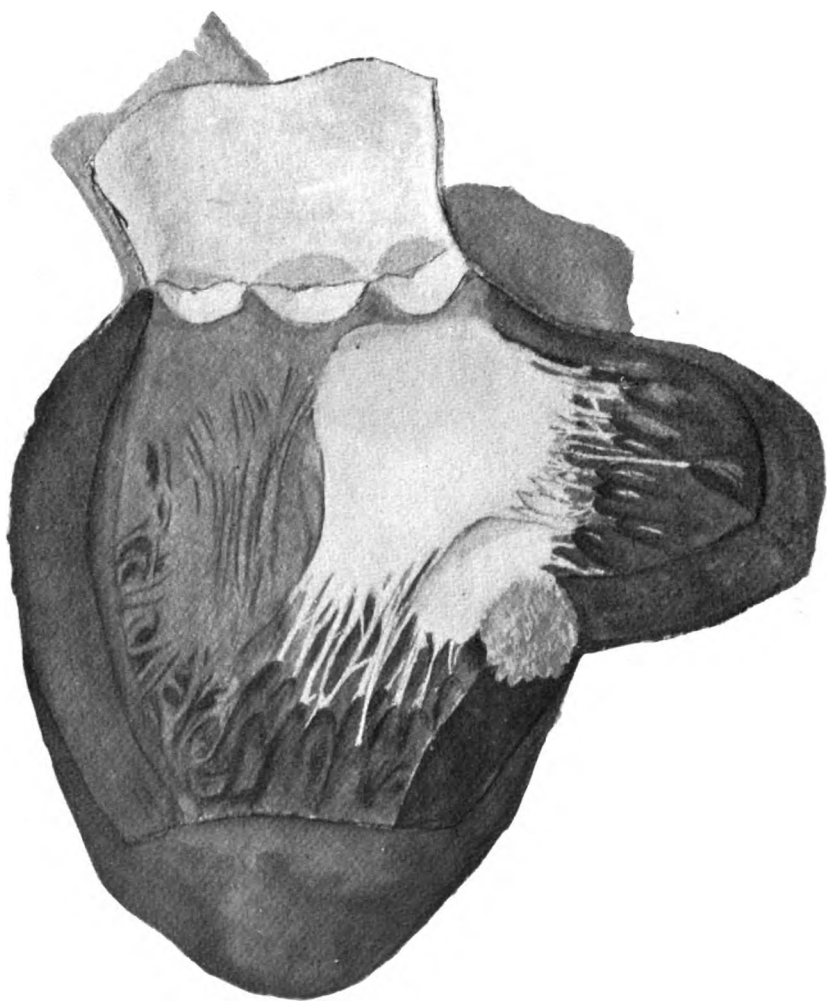


FIG. 1.—Ulcerative Endocarditis. Showing vegetation on mitral leaflet.



FIG. 2.—Ulcerative Endocarditis. Showing vegetation on pulmonary valve leaflet.

Medicine.

TWO CASES OF ULCERATIVE ENDOCARDITIS.

CLINICAL LECTURE DELIVERED AT THE HOSPITAL OF THE UNIVERSITY OF
PENNSYLVANIA.

BY WILLIAM PEPPER, M.D., LL.D.,

Provost, and Professor of Medicine and of Clinical Medicine in the University
of Pennsylvania.

GENTLEMEN,—The subject to which I shall call your attention this morning is that of ulcerative endocarditis, to illustrate which we have the specimens upon the table. The history of the first patient, from whom these organs were removed, is as follows: He was a prominent lawyer, aged sixty, dwelling in one of the sections of this State that were inundated in 1889. At that time (about a year and a half ago) he was much exposed to damp in endeavoring to regain his books which had been thrown to the floor and buried beneath twelve inches of river mud. It was later found impossible to render his office thoroughly dry or to rid it of a certain odor that had made its appearance. In addition to the fatigue and vexation incident upon the disaster to his house, he was hard pushed by his legal practice, and in consequence lost much rest. During the early autumn of last year (about in October, 1889) it was noticed that his vigor was not up to its usual standard, but he did not consult a physician until March. He then seemed to have a slight form of influenza. He was put to bed, and given quinine on the supposition of a possible malarial trouble. He had mild fever of irregular course. He remained in about the same condition until June. His ailment was certainly not typhoid, and equally clearly was not exclusively malarial, as it yielded to neither time, rest, quinine, nor arsenic, the fever continuing steadily. It is altogether probable that a true malarial element was associated at the outset, as a marked development of malarial poison followed the inundation above mentioned. During June his condition somewhat improved, although slight pyrexia still continued, and he was allowed to

drive out. In July he went to the sea-shore and there remained until September. While there he had a sharp attack of rheumatism affecting the ankles, toes, and some of the joints in his upper extremities. During this attack his fever was elevated above its usual course. At about the middle of September he returned home in just about the same condition as on his departure. He still had the irregular fever, was decidedly weaker and paler, and was able to take but little nourishment. These were all the symptoms that were present at that time. He was again confined to bed, his diet and hygiene carefully regulated, but a few days afterwards he was suddenly seized with a terrible pain in the splenic region rendering him unable to move. It was at this time that I was first sent for to see him in consultation with his physician, Dr. ———, to whose courtesy I owe the opportunity of reporting this important case. He then had an expression of intense anguish. He lay upon the left side, and it was impossible to move him owing to the great pain occasioned by every such effort. His pulse was very rapid, his features deathly white and sunken. His temperature had fallen, but again risen. (I think that when I saw him it was $102\frac{1}{2}^{\circ}$ F.) Although my examination could not be complete, we satisfied ourselves that there was some unnatural dulness about the lower splenic region. At this time also there was noticed a systolic murmur in the mitral area. He improved, but never got beyond a certain point—much below where he had been before this attack. The mitral regurgitant murmur persisted and increased steadily in intensity. Later the urine became albuminous. The splenic dulness was distinctly increased in area, being constantly equal to six by four inches. There were no evidences of pleurisy. He had two outbursts of what was apparently rheumatism affecting the knee and ankle. There were also great fever and increasing disturbance of the pulse. The patient died a few days ago.

Here are the notes of the autopsy made by my friend Dr. F. A. Packard three days ago: The body was not emaciated. The skin was very white, and on the arms and legs there were a few purple areas, somewhat shot-like to the touch. There was a moderate amount of normal subcutaneous fat. The spleen was far back in the abdominal cavity and not at first visible. There was no fluid in the peritoneal cavity. Much fat in the peritoneum and about the abdominal organs. Omentum well spread out. About one-half inch of the liver projects below the costal margin. There was no pleural effusion, but there were firm adhesions about both apices.

The pericardium contained no excess of fluid. Between the right

auricle and the parietal pericardium were numerous delicate and a few thick and firm adhesions. The parietal pericardium was otherwise normal. Much subpericardial fat over the heart. The wall of the right ventricle was then partially incised with a knife at a red heat, and a platinum needle at white heat thrust through into the ventricle. After allowing a moment for the needle to cool, it was moved about, quickly withdrawn, and thrust upward into an inverted test-tube containing sterilized agar-agar. The heart (see Fig. 1) is seen to be both elongated and broadened; the right auricle slightly dilated, its muscular wall of normal thickness. The left auricle was hypertrophied and possibly slightly dilated. Foramen ovale closed. The right ventricle contained an ante-mortem tough blood-clot extending far into the pulmonary artery. Its cavity was somewhat dilated but was otherwise normal. The valves of the right side of the heart are normal. The left ventricle is dilated and its wall thickened, but the muscular substance is of good color. The aortic semilunar valve-leaflets are normal. About the orifices of the coronary arteries are scattered small opaque patches of fatty degeneration. The coronary arteries themselves are normal. The posterior mitral leaflet is tightly adherent by its ventricular surface to the heart wall in its immediate neighborhood. The chordæ tendinæ are white and thick. From the edge of the posterior mitral leaflet there grows a crab-like mass hidden in the mitral funnel. It is of about two centimetres in length and twelve millimetres in breadth. On examining closely it is seen that the smooth covering of the anterior surface of the growth is continuous with the endocardium covering the valve-leaflet. On the opposite surface the growth is of a ragged, irregularly cupped shape, with irregular teat-like projections surrounding one of its margins. The other edge is smooth, thick, and rounded. The bottom of this depressed surface is rough, devoid of endothelium, and evidently ulcerated. Behind this mass the chordæ tendinæ run up from both papillary muscles to the posterior leaflet. From the centre of this mass another agar-agar tube was inoculated.

Here you can very readily see the conditions mentioned; note, then, that we have here, so far, a heart that shows the results of a slight pericarditis, that shows dilated cavities, with no material changes in its aortic leaflets, but extensive ulceration of this adventitious body. Here is the vegetation looking like a little piece of cauliflower of the size of the end of your finger, the under surface of which is roughened and devoid of endothelial covering. So that we had to do with a case of ulcerative endocarditis.

The autopsy notes state also the condition of other organs, as follows: The left lung in its upper lobe was slightly emphysematous, the lower lobe pinkish in color and of a smooth surface. Over the surface of the lung are four or five small purplish-black elevations of a diameter of three millimetres. On section these are found to be flattened, dense, subpleural, of a depth of one and a half millimetres, and not wedge-shaped. They are black with, in some, a speck of white in the centre. At the apex is an irregular area, about four centimetres long by one and a quarter centimetres broad, of cartilaginous hardness and slightly raised above the surrounding surface. On section this is found to be entirely confined to the pleura. The whole lung is very œdematous. The right lung presents precisely similar conditions, but the whole lung is more emphysematous, and there is a dark, soft, papilloma-like mass, of small size, projecting from the surface.

These lesions were evidently not areas of infarction or connected in any direct manner with the major condition.

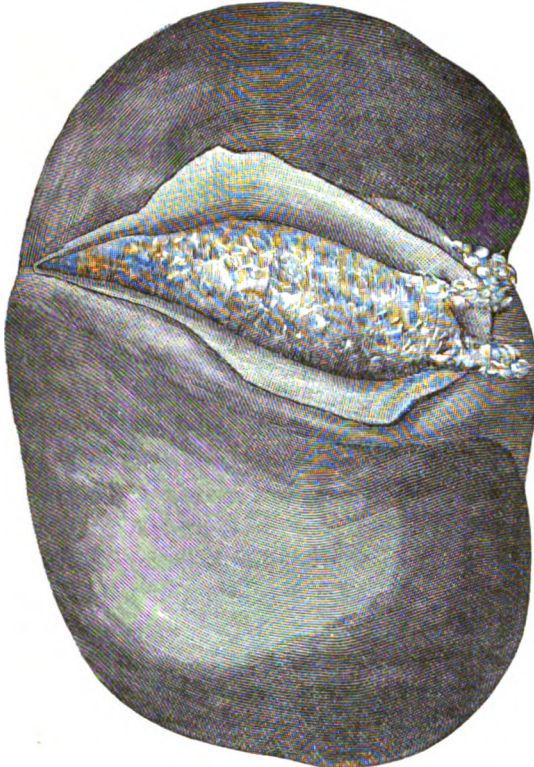
There was no dilatation of the aorta.

The vessels and ducts going to and from the liver were normal. In the gall-bladder, which was smaller than natural, there were felt to be calculi that will be more minutely described presently. The duodenum and stomach were normal. The bile-duct was patulous, as was proved by the exit from the papilla of a dish-water-like fluid upon pressing the gall-bladder. The spleen is large, and was tightly bound to adjacent parts upon its lateral, posterior, and superior surfaces. It extended from the fifth rib above to the ninth below, and was firmly fastened to the peri-renal tissues. In removing the spleen a slight rupture occurred, giving exit to pus. It was found, as you can see by the specimen before you (see Fig. 3), that about one-half of the splenic mass, occupying the central portion of the organ, was of a paler color than the slate-colored extremities, was tense, and presented marked fluctuation. Through an incision made part way through the wall of this abscess by a knife at white heat a sterilized platinum needle was thrust, while still glowing, into the centre of the cavity, and, after waiting for it to cool, and after moving it about through the contents, was used to inoculate an agar-agar tube in the same manner as in the case of the heart. Upon incising the abscess freely it was found to be formed in the midst of splenic tissue of a paler color than normal, and excavated by numerous communicating caverns with ragged semi-gangrenous walls. This cavity was filled with buff-colored, smooth, creamy, and perfectly inodorous pus, flowing freely and slightly blood-tinged.

The adrenals, the renal vessels, and the ureters were normal except

for slight darkness of the first named. The left kidney was large and heavy and its surface smooth. An agar-agar tube was inoculated by a needle thrust into its centre, in the same manner as in the other organs. On section the parenchyma pouted slightly beyond the capsule, showing some increase in the amount of tissue of the organ. The capsule stripped off readily, the surface beneath being mottled with prominent

FIG. 3.



Splenic Abscess from case of Ulcerative Endocarditis.

stellate veins. There was no diminution of the cortical portion, although the vessels were very plainly visible in that area. The right kidney resembled the left.

The liver was punctured and another tube inoculated. This organ was large and heavy, the enlargement being chiefly of the right lobe. Its color was pale, and on section it was seen to be fatty. There was no dilatation of the ramifications of the bile-ducts within the liver. In the gall-bladder, beside some glairy mucus of a pinkish color, there were found four gall-stones, one large and two small calculi lying close

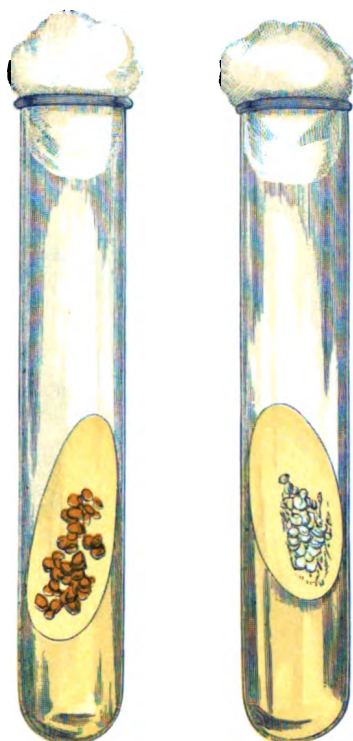
to the exit, one large one being firmly fixed in the bas-fond by a dense fibrous ring. These calculi were evidently merely accompaniments of his condition, being in no way connected, either as cause or effect, with the disease that compassed the patient's death.

Upon exposure of the abdominal aorta there was seen, just above the bifurcation and on its anterior surface, a purplish spot of about two millimetres diameter. Upon slitting up the aorta this spot was found to correspond to a dime-sized atheromatous ulcer. Throughout the course of the aorta there were scattered areas of fatty degeneration of the endothelial layer, but no other ulcers were present. The vena cava, pancreas, and intestines were normal. The brain and spinal cord were not removed.

The inoculated tubes were given to Dr. Allen J. Smith for further study, and I have also requested him to make sections of the viscera, in order to determine both their general histological character and the exact location of the micro-organisms within their structure. I have here five test-tubes containing a slightly-tinged solid material which in this tube, labelled blood from right ventricle, you see is perfectly transparent. In the other tubes (see Fig. 4) you notice small white specks. These little white areas have been found on examination by Dr. Smith to be composed entirely of numberless minute organisms of the kind known as *streptococcus pyogenes albus*. We have now determined, in addition to the facts revealed by the autopsy itself, that the liver, kidneys, splenic abscess, and mitral vegetation all contained in their interior the same kind of micro-organism, the only tube that gave negative results being that inoculated with blood from the right cardiac ventricle. The report upon the specimens referred to Dr. A. J. Smith for microscopic and bacteriological examination is as follows:

"Cultures upon agar-agar, made from inoculations from the vegetation, from the blood of the left heart, from the spleen, and from the left kidney, were found after two days in a temperature of body-heat to have developed well-marked white colonies of micro-organisms (see Fig. 4), the only tube failing having been inoculated from the blood of the right heart. These colonies macroscopically and microscopically presented the features of *staphylococcus pyogenes albus*; and the micro-organism was found in large numbers in sections of the valve (Fig. 5) and spleen (Fig. 6). Section of the vegetation upon the valve presented the interesting feature that the greatest bulk of cocci were to be found not directly at the surface of the mass but deeper in the substance, near the valve-tissue, the outer part of the section being made up of a freshly deposited layer of fibrin with a less degree of

FIG. 4.



Staphylococcus
Pyogenes Aureus.

Staphylococcus
Pyogenes Albus.

Tubes of agar-agar, showing growth of
micro-organisms.

FIG. 5.



Section of spleen, showing masses of micrococci
and clusters of haematoidin crystals.
Zeiss, obj. 4, oc. iv.

FIG. 6.



Section of mitral vegetation, showing masses of micrococci.

micro-organismal infiltration. The substance of the vegetation about the deeper parts, where the micro-organisms are in larger quantity, is made up of granular matter, and without the fibrillæ which are noted in the later deposits of the fibrinous vegetation. The valve-tissue beneath the vegetation is more or less invaded by the micro-organisms, and infiltrated with formative cells. The splenic tissue in the wall of the abscess is studded with small masses of micrococci, and throughout is the seat of numerous clusters of hæmatoidin crystals, some of the crystals having a regular rhomboid shape, others appearing in masses resembling the spiculated uratic crystals of the urine. The splenic cells refuse to stain well, but appear otherwise unaltered."

Let us briefly review the facts now known to us in regard to this case. A man, previously healthy, is suddenly exposed to physical toil and mental worry under extremely insanitary conditions, the latter persisting for a long time. General ill health followed in about a half-year, with no definite symptom except long-continued moderate fever and the occurrence during the past summer of a rheumatic attack. Suddenly acute pain develops in the left hypochondrium, and on examination there is found to be an unnaturally large area of dulness in the splenic region. An apical systolic murmur was discovered, which steadily became more pronounced. The diagnosis of ulcerative endocarditis with embolism of the spleen was made. The patient dies, and we find the conditions that you have just heard.

We have here, therefore, an example of infectious or ulcerative endocarditis. This disease is not common, and it is fortunate that it is not so, for, so far as I know, it is invariably fatal. It is an infectious disease running a variable course. I have seen it complete its career in six weeks, and, on the other hand, have watched it for a period of six months. I have seen it attack persons whose hearts I have known to be previously perfectly healthy. In regard to this case, I do not know whether the vegetation here present has been entirely formed since February. I am inclined to believe that it has, because up to that time the patient was remarkably vigorous. From this ulcerated surface a slow infection of the body has taken place, with involvement, towards the latter part of the case, of the kidneys, as proved by the presence of abundance of albumin and casts in the urine.

This case is one of great interest, but you must not think that every endocarditis met by you is of this character. I attach much diagnostic importance to the continued obstinate fever and the splenic enlargement, with late involvement of the kidneys, where the results of urinary examination could not be explained by congestion due to

cardiac disease. Do not, moreover, let the occurrence of albumin in the urine of a case with heart-disease lead you to light upon the diagnosis of infectious endocarditis unless you have some other symptoms or signs to substantiate it, as in this case where we had the continued fever with evidence of splenic embolism.

CASE II.—I wish now to show you the specimens from an interesting case, with somewhat similar features, which I saw a couple of weeks ago in consultation with my friend Dr. Yarrow. The story of this case was most peculiar. The patient was a middle-aged man, fifty-four years of age, with heavy business cares resting on him. He was a man of exemplary habits, with the exception of a constant tendency to overwork and a habit of worrying over his work. Dr. Yarrow, than whom there is no more experienced man or more acute observer, had known this man for fifteen years. For certainly ten or twelve years he had been in the habit of seeing his patient with extraordinary attacks occurring at irregular intervals. Dr. Yarrow would be summoned urgently to see him, and would find him with violent fever, a temperature of 104° F., very rapid pulse, and much disturbed breathing, and would think that he was going to be very sick. The next morning he would call early and find that the patient had gone to work, the fever having broken during the night with a copious sweat. Dr. Yarrow told me that he had seen repeated spells of that kind when he thought that the man was in for a serious illness, and yet in thirty-six or forty-eight hours the temperature would again be normal or subnormal and the patient at work. He was never able to satisfactorily explain these attacks. They were like those of malaria, but antiperiodics had no effect. Sometimes he would go a year, and sometimes two or three years, without such a spell. Dr. Yarrow could not get out of his head the idea that there must be some septic cause which led to these explosions of fever. The man kept on at his work, growing a little thinner as the years went on, but no material change was noted. About three and a half weeks ago he was taken sick with catarrhal pneumonia and was very ill indeed, so much so that for two weeks his physician was exceedingly anxious about him. The right side of the chest was full of râles, with evidences of consolidation here and there. The temperature reached 103.5° to 104.5° F., and the pulse was rapid and weak. There was inability to retain much food, and the patient showed a marked tendency to sink into a typhoid state. With the greatest care the stomach was kept in shape, and he gradually improved until at the close of the second week he was to all appearances convalescent. This was three or four

days before I saw him. He began to want to get out of bed and desired solid food.

He said that he was gaining strength every day, when suddenly he was seized with a series of enormous, colliquative, liquid stools. He had not had a particle of solid food, and there had been no exposure. This was attended with such collapse that it was thought he would die. By hypodermic injections of ether, with hot applications to the surface, Dr. Yarrow succeeded in rallying him, and then the temperature went up to 105° F. When I saw him in consultation the temperature had fallen to 97° F., with profuse sweating and with more of these horribly stinking, colliquative stools. The man looked very ill. His mind was dull and clouded; the day before, it had been perfectly clear. The pulse was bad, as was also the breathing. That afternoon the temperature again reached 105°. For four days the temperature continued in this way, with a range of six to eight degrees in the twenty-four hours. Every time the fever broke, there would be a gush of colliquative fetid stools. The lungs became filled with râles from hypostatic congestion. The heart-action was feeble, and the pulse was miserable. When the fever was present the pulse-rate would reach 160 per minute, and when the fever broke it would fall to 60.

The explanation of this condition was exceedingly obscure. Had it occurred in a man who had never exhibited any peculiar pyrexia, it would have been inexplicable. It was impossible not to connect this with the strange spells of fever which the man had shown through a number of years. Both Dr. Yarrow and myself reached the conclusion that there was some source of sepsis in this man's body, some source from which putrid, poisonous, septic matter had entered the blood from time to time, and that with each entrance there had been an explosion of fever; that in the earlier attacks only small amounts had entered, but that in this last attack a large amount of this matter had passed into the blood, and that in his enfeebled condition it was impossible for him to stand it. It was not improbable that the pneumonia had really been a septic pneumonia. As we expected, the case terminated fatally on the fifth day after this explosion of fever. Our suspicion was that this was a case of ulcerative endocarditis.

My friend Dr. Frederick A. Packard assisted Dr. Yarrow with the autopsy, and I have here his notes which I shall read.

"Rigor mortis moderate. Body fairly nourished. Over the chest was a slight macular eruption, due to external applications(?). A fair amount of subcutaneous fat. Organs of the abdomen in normal position. A large amount of peritoneal fat was present.

"The costal cartilages somewhat ossified. No fluid in the pleural cavities. The left lung firmly but not closely adherent at all parts. In the right pleural cavity were some scattered friable adhesions. The pericardium was normal and contained no excess of fluid. The lower lobe of the left lung was congested; the upper lobe showed at its superior portion a non-crepitating dark area (about one-fourth of the whole upper lobe), of smooth section, but not heavy enough for croupous pneumonia. The lower half of the upper lobe presented, on section, a grayish appearance, the surface looking honeycombed, there being numerous small air-spaces surrounded by thick trabeculae. The pulmonary artery and veins were normal so far as they could be slit up. The right lung showed emphysema in patches, and the whole lung was much congested. Right pulmonary artery and veins were normal. There were no evidences of emboli, of infarctions, or of abscess in either lung.

"The heart is of a somewhat square shape. Too much of the apex is made up of the right ventricle. The auricles are normal. Foramen ovale closed. The tricuspid orifice easily admits four fingers. Upon opening the right ventricle it is found to be very thin (in places one-tenth to one-eighth inch in thickness) and its cavity much dilated. The endocardium over the general surface of the ventricle is smooth and normal. The cavity contained a tough ante-mortem blood-clot. The tricuspid valve-leaflets are normal. Attached to the border of the posterior pulmonary semilunar leaflet is a fleshy mass (see Fig. 2), of about the size of the last phalanx of the thumb, freely movable, and covered with adherent pale and dark masses and shreds of fibrin. On removing these clots, the mass is seen to be attached to the free border of the remains of the posterior leaflet. It measures three-quarters of an inch transversely, one inch from free to attached borders, and is one-half inch thick. It is cauliflower-like, with shallow and deep pits and fissures. When cleansed, its color is seen to be dull white and in places purple. The growth is divided into two main portions by a deep sulcus. One portion contains a purplish prominence, cystic to the touch and apparently containing blood. A small opening was found leading from the pulmonary surface into this portion, where the point of the probe moves freely as though in a cavity. The posterior pulmonary leaflet is practically absent except for the portion involved by the growth. The line of former attachment of the valve can be seen by a slightly elevated and ulcerated ridge. At the point of junction of the posterior and left leaflets there is a stump of thickened valve-tissue having two little prominences on its free extremity. The

left pulmonary leaflet is rough and thickened and ulcerated at a point about one and a half lines from the centre of its free edge.

"The left ventricle is of normal size, its wall one-half inch in thickness. The mitral orifice admits two fingers and the tip of the third with difficulty. The mitral-valve leaflets are normal except for a small patch of early atheroma on the ventricular surface of the anterior leaflet close to its attached border. The aortic valves are normal. The coronary arteries are normal in number and position. There is slight early atheroma at the root of the aorta in patches.

"Stomach and duodenum normal.

"Bile-duct patulous. Vessels and ducts at notch of liver normal. Gall-bladder distended with thick bile. Small intestines normal. Large intestine normal. Vermiform process healthy and free from adhesions. Spleen large (six by three and a half inches), soft, and purple, but without infarctions. Pulp soft and of a good color.

"Suprarenal capsules and pancreas normal.

"Ureters are normal, as also the renal vessels. The kidneys presented identical appearances. They were slightly enlarged, of normal color, with numerous smooth, irregularly-shaped pits upon their surface. On section, the capsules stripped off readily. Relation of cortical to medullary portions normal except where the pits were present; in those places the pitting was seen to be at the expense of the cortex, seeming to be old emptied cysts that had caused atrophy of the cortical portions.

"Bladder normal except for slight ribbing. Prostate gland, seminal vesicles, and rectum normal.

"Liver of good color and normal.

"Aorta and vena cava normal.

"Peritoneum and subperitoneal tissue normal. Mediastinal tissues normal.

"Inoculations of agar-agar tubes made from the heart vegetation, from upper lobe of left lung, kidney, and liver.

"Pieces taken for section from kidney, liver, and two different portions of upper lobe of left lung."

Dr. Smith's report of the microscopical and bacteriological examination is as follows:

"The tubes inoculated from the vegetation and from the lung showed, after several days at the ordinary temperature of the room, growths of a yellow color (see Fig. 4), which upon examination presented the characteristics of *staphylococcus pyogenes aureus*. Sections of the organs failed to show the presence of micro-organisms save a

few small groups in the hepatic structure. The liver-tissue appeared to be in a somewhat degenerated condition, the cells swollen and granular, with considerable biliary deposit; the same change may be said to have been present in the kidney, there being noted a slight degree of cellular enlargement with occasional desquamation. The pulmonary section showed a congestion with slight parenchymatous hemorrhages, but was not otherwise noteworthy."

Here then we have this interesting lesion of the pulmonary valve which must have lasted over a long period without apparent symptoms. This man was not under continuous medical observation until three weeks before his death, and was filling an important business position requiring constant activity. The long-continued character of this lesion indicates that the spells which I have described may have been, and I think probably were, connected with ulceration in this lesion. Certainly the last attack was in all its features an acute process of ulcerative or malignant endocarditis. Whether I am right or wrong in explaining these remarkable outbursts of hyperpyrexia occurring over a period of years as due to the entrance of septic matter from this lesion, and I think that is the most plausible explanation that can be given, there can be no doubt as to the nature of the last and fatal outbreak. If we accept these statements as facts, this case is unique in the history of ulcerative endocarditis. My own belief is that not only was the last attack ulcerative endocarditis pure and simple, but that in this case there occurred from time to time little points of ulceration and the entrance of septic matter into the blood, thus explaining the serious and violent outbursts and other curious phenomena of the case. The specimens are before you, and altogether, pathologically and clinically, the case is one of the deepest interest.

PLEURITIS AND STIFFENING OF JOINTS BY CHRONIC INFLAMMATION; GENERAL FALSE ANKYLOSIS.

CLINICAL LECTURE DELIVERED AT THE RUSH MEDICAL COLLEGE, CHICAGO.

BY NORMAN BRIDGE, M.D.,

Professor of Clinical Medicine and Physical Diagnosis in the Rush Medical
College, Chicago; Attending Physician to the Presbyterian Hospital.

PLEURITIS AND STIFFENING OF JOINTS BY CHRONIC INFLAM- MATION.

GENTLEMEN,—I have brought this patient before you to show a slow but nearly complete recovery from pleuritis of recent date, but especially that I might speak of the disease that brought him to the hospital four months ago. This is the patient who was aspirated in the presence of some of you a few weeks ago. He was pretty healthy as a youth, except that he sustained an injury from which he acquired an ankylosis of his left elbow-joint. That, however, has nothing to do with this sickness. About a year and a half ago, as a result of a lift or sudden exertion, he had an acutely oncoming pain in the lumbar region, which must have been an ordinary lumbago. I suppose that he recovered from that perfectly, and last February commenced to have the disease that brought him to the hospital. He first noticed that it was difficult for him to raise the right thigh, and hence had a limping gait. A slight feeling of discomfort and obstruction occurred in the groin. After a few weeks or months the disorder appeared in the left side, but not so severely as in the right, and has continued in both locations up to the present time. An important question has been whether these symptoms were evidence of a disease of the spinal cord or of the fibrous and muscular tissues exclusively. The sensation in his lower extremities is perfect. He feels everything. The knee reflexes are about normal, without exaggeration. He can make all motions that any one can make, except the one mentioned. The diffi-

culty seems to be in and about the hip-joint. Since he has been in the hospital a new symptom has occurred, namely, tenderness in the ball of the right foot,—i.e., in the metatarso-phalangeal articulation of the great toe. There is no difficulty in moving the foot or knee. When he flexes the left thigh the tendency is to rotate it outward so that with the left knee bent the foot is thrown above the right knee. There is the same difficulty, but to a less extent, with the right one. He tries, but cannot hang the leg and thigh down straight from the body. It hurts deep in the groin to do that. In rising, you notice, he lifts himself from the chair by means of his hands and cane, and avoids flexing his right knee. A normal person in rising from a chair never does that. This gentleman must do it. The reason for it is the difficulty in bringing his foot back to a point near his centre of gravity, a motion that requires the flexion of the thigh. As he walks you notice that there is a reduction in the motion of the right hip. You would define the difficulties that this patient exhibits in walking as a partial loss of motion resulting from pain; but, if you will observe, you will perceive that he lifts the right knee less than the left in walking. Moreover, when he is standing on the right foot there is a tendency to get on the left a little more promptly, the act causing pain, which he locates deep in the groin of the right side. You note that there was a hesitancy when he reached a point about midway in the excursion of the knee in the act of flexing the thigh; when it passed that point it came up easily. You noticed also that when he sat down he did not flex the right thigh, as a person in a normal condition does in sitting. When he came to the hospital this manœuvre was much more difficult for him than now. It seems to me that he is improving somewhat in the motion of his hips. In the soft tissues above the joint there is a slight tenderness on the right side. There has been no evidence of acute inflammation in the joints, and I have felt forced to believe that there was no disease of the spinal cord whatever. He voids urine and fæces normally.

It seems to be a case of chronic inflammation of the fibrous tissues about the joints that has led to partial ankylosis. Therefore it is not a nervous disease at all. Since he came to the hospital he has had some painfulness of the right foot and more or less pain in the small of the back, that I could not associate with any difficulty of motion. He has never had any difficulty with his upper extremities that, it seems to me, belongs to this disease.

The chronic inflammations of joints that lead to partial or complete ankylosis are extremely interesting. They usually attack only a few

joints and sometimes only one. Sometimes the trouble begins as an acute inflammation and in several joints, finally remaining as a chronic inflammation in only one. Sometimes several joints are involved in succession, some of which become more or less ankylosed. There is almost never any suppuration from any of these joints. These inflammations are extremely chronic; they come on slowly and progress slowly, but it is almost certain that the case most likely to recover entirely is the one that begins with acute inflammation. This patient has been taking various alteratives, which latterly have been omitted. Now, as to the pleuritis, you notice as I percuss his back that there is a higher pitch on the right side than on the left. Percussing now with an instrument that makes a lower-pitched tone, you perceive that it is almost flat, low down on the right side. Even upon a level with the spine of the scapula there is some dulness on the right side. Resonance on the left is distinct and good. It seems to me I feel as much fremitus on the right side as on the left; and on auscultation I can hear lung-sounds on the right side which seem to be clear but distant, while on the left side they are rather puerile. I think there is no increase of fluid since we put in the needle, but that it has been rather decreasing. He has had no return of fever since it left him finally as his pleurisy improved. His appetite is fair and he feels quite well. His joint-troubles seem to be slowly improving. I think we will continue the simple tonic treatment he is now having.

In discussing the subject of pleurisy the other day you will recall that I laid no particular stress on the value of counter-irritation in this disease. I believe it is not important except in rather chronic cases, when I think the application of almost any substance that will produce otherwise harmless counter-irritation is valuable. With this patient, in his present condition, I do not see any demand for its use.

GENERAL FALSE ANKYLOSIS.

Here is another case which shows how a man can become helpless and yet be in pretty fair general health. This man, some forty-four years old, looks well, has a good color, fair appetite, and good digestion; his bowels are regular, and he sleeps well; sometimes pain keeps him awake, but rarely any other thing. The trouble began twenty years ago. The first symptom was pain in the muscles of the sides of the spine. It got worse, and he was laid up two or three months and then recovered. He afterwards had some rheumatism in the muscles of the legs, as well as in the neighborhood of the spinal column, and took

to his bed. He was able to get up every day, however. The rheumatism, he says, was general, but no particular joint became chiefly involved; the muscles were the parts affected more than the joints. At the end of three months he recovered, without resulting stiffness. He was well then probably eight years. Since that time he has been laid up for two or three days at a time, possibly four times, with the same muscular pain. The present sickness began about the first of last February (1889), twenty-two months ago. Previous to that, two years ago, he had a spell which made him unable to work, but he was not laid up entirely. He did not work all winter, his business being office work. Then he got better, but not entirely well, and was lame all summer, the pain being always between his knee and hip. In February, 1890, his symptoms became aggravated; he soon got so lame that he could not walk. The trouble in his neck began as a crick in the back portion thereof, some ten years ago, lasting a short time only. After that it recurred occasionally. It kept getting worse, each seizure leaving a degree of stiffness, until two years ago the neck grew quite stiff and has not been freely movable since; now it is hardly movable at all.

Such is the account that the patient gives of himself, and it is a most interesting one. He locates all his attacks in the muscular tissue. He can move the left hand perfectly, also the elbow, but when he attempts to lift his shoulder you notice a tremor in the muscles of the arm. As he moves it, or as I move his shoulder, I perceive a grating sense and I make his muscles tremble, as you see; and when I lift it up and hurt him he locates the pain in the deltoid muscle. When I move the limb forward and backward it hurts him also. So far as to the left side. He cannot lift up his right arm. I may put the extensor muscles of the forearm on the stretch and hurt him. It seems to be largely a trouble of the muscles; the joint is not specially tender. I hurt him on the right side at the same point and produce a severe pain when I extend the humerus about half as much as I extend the opposite one. He can move his feet fairly well, but when we attempt to move his knees it hurts. The right knee-joint is somewhat swollen and the left possibly a little. Any manipulation of the knee causes pain, but the pain is much less in the knee than in the thigh. He never had much pain in the ankle; he locates the pain in the thigh. When I put the hamstring muscles on the stretch it hurts; and any attempt to extend the leg completely hurts him very sorely. He will not allow me to flex his thigh a particle. When I attempt to rotate the femur, causing the sliding motion of the

right hip-joint, it causes acute agony, but chiefly located in the thigh. He has complained of a good deal of pain in his thigh which has seemed to me to be connected with spasmodic action of the muscles of that part in their automatic efforts to keep the joints still.

Observe the patient's breathing. With his abdomen and breast uncovered you notice that his breathing is abnormal; it is almost wholly abdominal. By an effort he can expand his chest only very slightly, and this by elevating his ribs. That is evidence that there is something the matter at the joints of these ribs or some disease of the muscles that move them, or both. He says he could never expand his chest very much. It is evident that the rib-joints are partially ankylosed.

This feature—his neck—is noticeable. He can hardly move it at all. It is not painful nor tender, and manipulation is painless. If the difficulty were one of his muscles alone, his head would drop down upon the bed on removing his pillow; on the contrary, it stands projected from his body, free from everything, as though frozen in that position. Moreover, if the difficulty were one only of his muscles he could allow me to move his cervical joints easily and without pain. I attempt to move his head and I simply move his body as well; the head, neck, and body are one stiff, continuous mass. You can see the movements of the muscles as he attempts to move his head; they rise and stand out prominently, but there is hardly a particle of movement of the neck. The cervical joints are manifestly ankylosed by inflammatory effusion. (Patient dismissed.)

What was the nature of this sickness twenty years ago, and what is the nature of it now? That the fibrous tissues of the muscles have been involved to some degree there is no doubt; but probably he has had at times true myositis. Though he came to us with a belief thoroughly fixed in his mind that his disease was purely a muscular one and not of his joints, I yet have the impression that in each of his seizures the joint-tissues have been involved. It is so now. The whole spinal column is in a condition of almost complete false ankylosis. It has involved the hip-joints markedly, and the knee-joints to a slight degree, and the pain is not in the muscles, perhaps, so much as in the joints. Cases of joint-disease are produced frequently in connection with urethritis, and when they disappear, any fresh irritation of the urethra will be liable to again provoke a joint-disease, and lead to a chronic continuation of it and to the involvement of other joints; and sometimes these patients, long after the urethritis is apparently well, find a slight irritation of the urethra may again affect the joints. I know

that some doctors insist that the specific poison must be present in all these cases when the disease is reproduced. The question is not settled about the specific character of all these diseases, but it is an interesting clinical fact that when a few joints start to become inflamed, others become involved also, until, in an occasional case, the whole skeleton becomes involved. There are only a few cases out of the thousands of such where a great number of joints become involved. I do not know that this case was produced at the beginning by urethritis, but the evidence points to that conclusion. I am sure that I have observed cases of joint inflammation exactly like this in character, but much less extensive, occurring independently of urethritis, certainly of any specific urethritis. Joints have been ruined by ankylosis produced in this manner, and I am not, therefore, prepared to say that in this case the disease was started by a specific cause. In most cases of this sort that I have observed, the disease started in the fibrous tissues of the joints, and in every other way closely resembled those joint cases that are produced by specific urethritis. That is as far as we are justified in going, and we are justified in going that far. The treatment, however, is substantially the same in all cases of this kind, and, I assure you, it promises very little. Alteratives and wintergreen, perhaps phenacetin, and kindred drugs, promise something; massage and electricity should be tried also. The bichloride or biniodide of mercury should always be given the preference, and always be used in such small quantities as to act rather as a tonic than as a depletive measure. Daily manipulation of the joints is more valuable than this, daily systematic massage promising more than any other treatment whatsoever.

THE TREATMENT OF ENTERIC FEVER BY SYSTEMATIC COLD BATHING IN ACCORDANCE WITH THE METHOD OF BRAND.

CLINICAL LECTURE DELIVERED AT THE GERMAN HOSPITAL.

BY J. C. WILSON, M.D.,

Physician to the German Hospital, Philadelphia, etc.

YOU have now had the opportunity to observe for more than a year, in the service of my colleagues and in my own service in this hospital, the treatment of enteric fever by the systematic use of cold baths in accordance with the method of Brand, of Stettin. This treatment has consisted almost exclusively in a routine procedure, and in that respect is wholly at variance with the general teachings of this country in regard to the management, not only of this disease, but of the other acute infectious febrile diseases. It is, moreover, a treatment radically different from any method heretofore practised in the other hospitals to which you have access, and only briefly discussed in your text-books. It has now been systematically and continuously carried out in this hospital during a period of sixteen months; and our studies in regard to it embrace, so far as I am informed, a longer period of time and a larger number of cases than in any other American hospital. These cases, in comparison with the collections of cases studied in England and by English physicians in Australia, and particularly by the German and French military physicians, constitute a very limited experience. But they are collectively sufficiently large to warrant a review of our work at this time, especially as our results closely coincide with those which have been placed on record upon a much larger scale abroad.

In order that we may intelligently discuss this method of treatment, we must contrast its results with those of the methods in vogue around us; and we must, in so far as possible, agree upon certain definite tests by which to estimate their value. The clinical tests to which, by common consent, the results of therapeutic measures are to be submitted are two:

1. The general effect upon the course of the disease and the convalescence, as determined by the judgment of trained medical men.

2. Percentages of mortality.

For the purpose of discussion, we here eliminate from consideration the other acute infectious diseases, and restrict our observations to enteric fever.

Owing to differences in the diagnostic criteria among practitioners ; and to the difference in the intensity of the infective process as manifested by the symptoms, and especially by the temperature, under different circumstances, relating (a) to the previous personal condition of the patient, as regards age, sex, occupation, antecedent health, obesity, alcoholism, etc., and (b) to variations in general and local epidemics at different seasons and in different years, this test is often very uncertain. Its uncertainty is much increased by the bias of the observer and that curious penumbra of exact observation known as the personal equation ; but when a large number of independent observers, of wide experience in this and other methods, actuated by scientific motives, and striving only for the truth, attain a consensus of opinion as regards the general result, this test acquires a high value.

More precise as a test in an infectious disease such as enteric fever, which terminates fatally under varying circumstances, is the death-rate. A method of treatment which, upon a very large scale, at the hands of many different practitioners in widely separated localities, including patients of every age, all occupations, and the most diverse social conditions, shows an extraordinary, I may say astonishing, reduction of the death-rate in contrast with every treatment previously tested under similar circumstances, claims, at least, our immediate critical attention.

You have seen the method of Brand practised in the wards and in this amphitheatre time after time, until its scarcely varying procedure has become almost monotonous.

As a rule, the diagnosis is already possible when the patients are admitted to the hospital. It is based upon the history of the patient ; the temperature-range ; the presence of the papulo-erythematous rash upon the lower part of the chest, the abdomen, the thighs, or upon the back ; splenic enlargement ; and scattered mucous or coarse subcrepitant râles. Epistaxis, diarrhœa, dilatation of the pupils, tenderness in the ileo-cæcal and umbilical regions, and the appearance of the tongue constitute confirmatory evidence. The majority of our cases have presented the characteristic reaction in the urine upon the application of Ehrlich's test. Even when the diagnosis of enteric fever has only been

probable we have had recourse to the treatment by baths, whatever the symptoms.

The tubs are upon wheels, sufficiently elevated. They are kept standing in the ward, the temperature of which ranges from 65° F. to 70° F. They are filled by means of a rubber hose and emptied in the same manner, a hole connected with the waste-water pipes being made in the floor of the bath-room for the latter purpose. A sufficient quantity of water is used to cover the patient's body to the neck. One bath-tub is used for six patients; two attendants are sufficient for twelve patients. Our rule is to renew the water after six baths. As you have seen, the baths are prepared without disturbance or noise. There is placed near the head of the tub a large pitcher of water, slightly colder than the bath, of a temperature about 50° F.; drinking-water and wine are at hand.

The method employed here differs in only two points from that of Brand. The temperature is taken in the axilla or in the mouth, and the bath is administered regularly so long as it rises above 101.5° F.; whereas it is customary in the hospitals of Europe to take the temperature in the rectum, and the bathing is continued unless it fall below 102.2° F. (39° C.). The other point of difference consists in the administration here of one or, if necessary, two laxative doses of calomel shortly after admission, if the patient be received prior to the tenth day of the disease. Otherwise our method is precisely the same as that employed in Europe.

If there be perspiration, the patient is dried before entering the bath. He then sits upon the side of the bed, and with the assistance of the attendants removes his shirt and steps into the tub. His head rests upon a circular air-cushion. Cold water from the pitchers is poured upon the head and the back of the neck for one or two minutes, the amount being two to three quarts; or else a large compress wet with cold water is placed upon the head. A swallow of water or red wine is given from time to time during the bath, if necessary. The whole surface of the body is briskly rubbed by the attendants, and the patient is encouraged to rub himself. These frictions constitute an important part of the treatment. They stimulate the peripheral circulation, prevent the local accumulation of heat, moderate the disagreeable sensation of cold, and, in the words of Glénard, "help to pass the time." In the course of a few minutes, shivering appears, and the lips and extremities become somewhat livid. Towards the middle of the bath, or at its termination, cold water is again poured upon the head and shoulders. The time occupied by the bath has been, as a rule,

fifteen minutes. When the temperature has been very high, it has sometimes been prolonged to eighteen or even twenty minutes. On leaving the bath, the patient is wrapped in a coarse linen sheet, over which a blanket is folded, the extremities being thoroughly dried and rubbed. At this time a little wine or spirits is given. Shivering continues for a variable time after the bath; if it be unduly prolonged, the limbs should be rubbed and a hot bottle placed at the patient's feet. Three-quarters of an hour after the bath, the temperature is again taken. The procedure is repeated every three hours, unless the temperature falls below 101.5° F. The alimentation is liquid, nutritious, and carefully regulated. The patients in our wards have, as you know, received milk in abundance, with peptones, and from three to five raw eggs apiece daily. Neither age, sex, menstruation, pregnancy, nor sweating, except that which occurs during the defervescence, is regarded as a contra-indication to this treatment or as calling for any modification of it.

We have not hesitated to administer the baths in cases admitted with broncho-pneumonia or with croupous pneumonia as complications; nor have we modified the treatment where these conditions have developed after admission to the hospital. One accident only has induced us to abandon the use of the baths, and that is the occurrence of hemorrhage. It is needless to add that, upon the appearance of the signs of peritonitis, the treatment must be at once suspended. Diarrhœa has been rarely troublesome; it has been treated simply by the application of large cold compresses or ice-poultices to the abdomen. Constipation was relieved when necessary by enemata.

When the temperature no longer exceeds 101.5° F., defervescence being established, the baths are discontinued, and the patient is treated as a convalescent, being kept, however, in bed and upon a liquid diet until the evening temperature has been normal for a week. He is then allowed to rise, and in a short time to walk in the open air. Convalescence has in most instances been rapid, and the patients have, as a rule, returned to their homes within two weeks after the completion of the defervescence.

The treatment stands by itself as a definite procedure, not to be confounded with treatment by graduated baths, the cold pack, cold affusions, spraying, and other hydro-therapeutic measures. It is especially to be looked upon as a method entirely distinct and different from the antipyretic method. Upon this Brand and his followers insist.

You have seen in other hospitals other methods practised in the

treatment of this disease. The *expectant* plan, the *expectant-symptomatic* plan, the *antiseptic* plan, and the *antipyretic* plan,—all these, the details of which are modified according to the views of the physicians in charge, have been brought to your attention. You have had the fullest opportunity to study this disease in all its stages. It is not necessary to point out to you the great difference in the intensity of the cases. You have already learned that in this, as in the other acute infectious diseases, a certain proportion of the cases are essentially light, and run a favorable course without special treatment. This group of cases might be well treated upon the expectant plan or, at all events, with an insignificant medication. Perhaps your attention has not, however, been sufficiently drawn to the fact that certain of the cases, beginning mildly and running for some days a favorable course, develop intense symptoms or serious complications after the middle of the second week, and occasionally terminate fatally. Changes of this kind in individual cases cannot be foreseen. In this fact is to be discovered a serious objection to the expectant and the expectant-symptomatic plans of treatment. The development of serious symptoms in the course of the disease not unfrequently indicates a mischief already past remedy. It is then too late to accomplish important results by treatment directed against symptoms. The true theory of treatment demands the use of such measures from the beginning as will tend to diminish the intensity of the infection, on the one hand, and enhance the resisting power of the organism, on the other, in such a manner as to prevent the destructive processes to which the serious symptoms are due.

You are familiar from your ward experience and from your reading with the ordinary picture of severe typhoid fever,—the somnolence, alternating with delirium, the dilated pupils, the dusky face, the dry, parched tongue, the sordes, the tympany, the diarrhoea, the loss of muscular tone, reaching to the heart itself, with its vanishing first sound and the dicrotic pulse. Recall the patients whom you have seen in our wards under the bath treatment. They have been of every grade of severity, and a certain proportion of them have died. Let us contrast them, however, with cases of similar gravity treated by other methods. Let us apply to our treatment the first of the tests to which I have referred; let us study its general effect upon the course of the disease, and upon the convalescence in individual cases.

Brand declares that in cases treated from the beginning,—that is, before the fifth day,—the classical picture of typhoid fever is no longer seen; that there remains of ordinary typhoid nothing more than (a) a

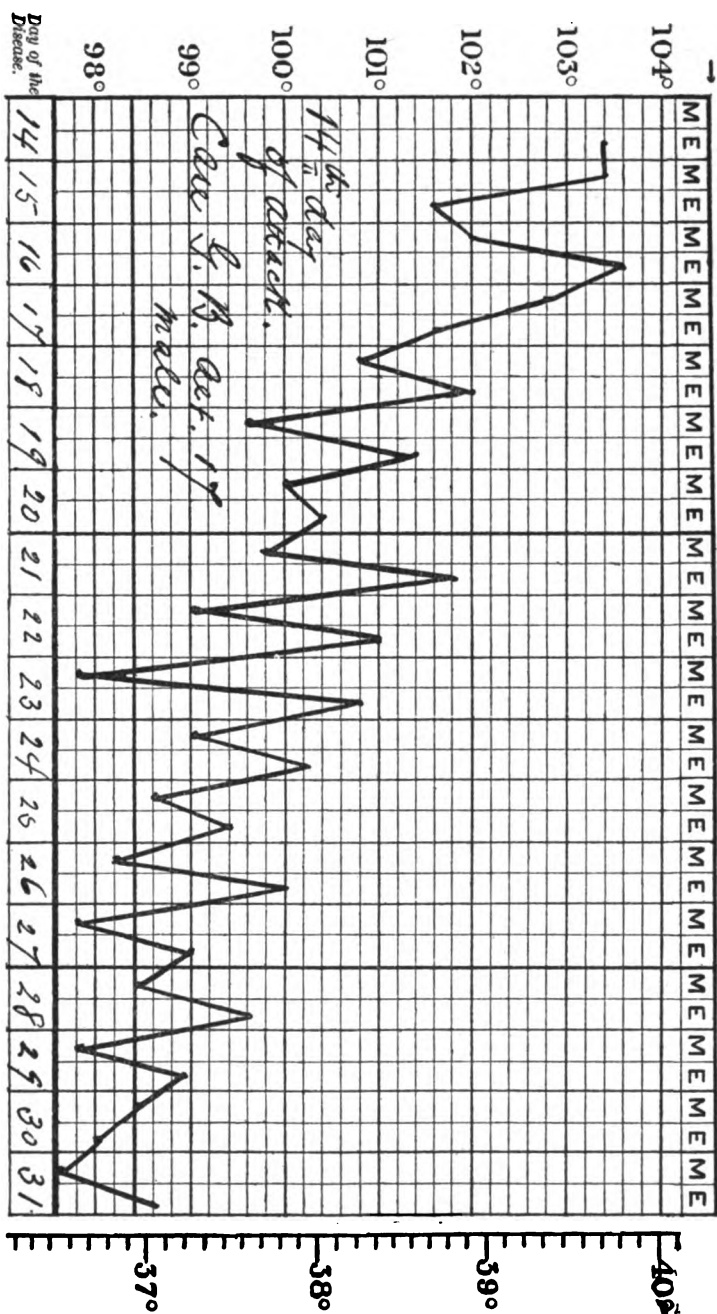
moderate fever, (b) an unimportant bronchial catarrh, (c) enlargement of the spleen, (d) the rose rash, and (e) infiltration of the intestinal glands. Everything else is prevented, and what might have been a severe case runs its course as a mild one, if the patients are brought under treatment sufficiently early. Exceptions to this statement occur only when complications develop at the onset.

These statements on the part of the originator of the treatment were not fully accepted by the profession at large. They were regarded on many sides as the expressions of an enthusiasm that had grown out of bounds. In fact, the method of Brand, treated with indifference outside of Germany, where it had originated, for a long time met with systematic and violent opposition in the country of its birth. By degrees it won its way into favor, step by step, in spite of this opposition. It is now the routine treatment in the German army and in many of the French garrisons; it is much used in hospital practice in England and in Australia, and has within recent years excited widespread attention in the United States.

The general testimony in regard to its effect upon the course of the disease in individual cases is in entire accord with the statement of Brand. The difficulty is that in the hospital practice in this country the cases do not come under treatment sufficiently early. Only in garrison life and in epidemics will a treatment so radical be justifiable at the onset of a vague febrile disease. But Brand's statement is to some extent true of cases to which the treatment is instituted at a later period, even so late as the middle of the second week. After six or eight baths the familiar picture is no longer seen; delirium ceases; stupor gives way to light somnolence, from which the patient is easily aroused with a bright expression and clear mind; the tongue becomes moist and clean and remains so; there is desire for food, and very commonly a complaint of hunger; the abdomen is not tympanitic; diarrhoea is rarely excessive or troublesome. Even in the very severe cases, those ending fatally, the grave phenomena are chiefly confined to the nervous system and the circulation. Thus we have profound asthenia and progressive failure of the heart.

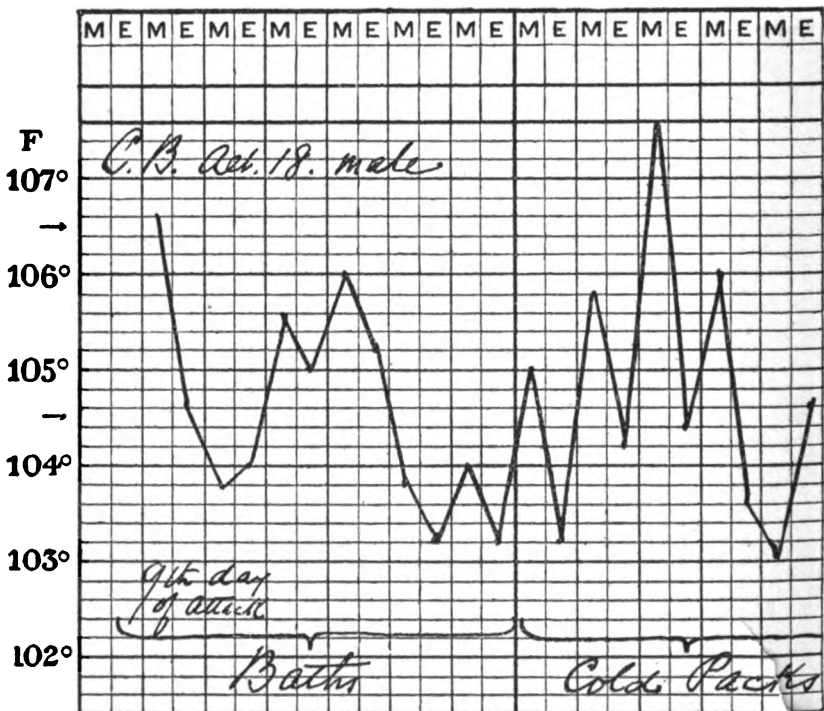
You have been impressed with the difference presented by our enteric fever cases treated by the baths and those which you have seen treated by the other methods. In particular is the influence upon the temperature to be noted. The fever is reduced by the bath, not as when internal antipyretics are used, at the cost of unknown and sometimes dangerous modifications of the functions of the nervous system, the blood, and the general nutrition, but by a process which has at the

CHART I.



same time a favorable effect upon them all. The favorable effect upon the disease is brought about by the control of the temperature, and at the same time by antagonizing those influences which are constantly tending to derange the normal functions; the treatment is directed against the typhoid processes as an entirety. The course of the fever is unquestionably shortened in the mild cases, so that the charts you have had the opportunity to examine show a considerable proportion of short cases and a few abortive cases. In the cases of average intensity and in the severe cases, however, the febrile movement does not appear to be abridged. In all cases the convalescence is shortened and sequels rarely occur. A striking modification of the general temperature-curve consists in the form of the lysis, which is usually prolonged and gradual, extending over a period of eight or ten days from the latter part of or from the end of the second week,—the so-called

CHART II.



second stadium of the fever. This range of temperature replaces the strongly-remittent fever-curve of this stadium ordinarily seen. The

modification is well shown in the accompanying chart. (See Chart I.) The immediate effect of the baths upon the temperature is shown in the table on page 28.

The figures are taken from the records in the case of C. B., a lad eighteen years of age, who was admitted on the eighth day of an extremely severe attack of enteric fever characterized by great elevation of temperature. The circulation was feeble, and, while the effect of the baths upon the temperature was favorable, the subsequent reaction was unsatisfactory and the prolonged lividity of the extremities and the profound weakness led my colleague, Dr. Trau, to whose care the patient was transferred on June 1, to substitute cold packs for the bath, as involving less disturbance. This change, which took place at the end of the second week, enables us to compare the effect of the baths with that of the cold packs. The temperature chart of this case shows the general effect upon the temperature-range as made up from the morning and evening observations; the table shows the immediate effect of each bath during a period of six days, and of each pack during a subsequent period of six days.

As will be seen by Chart II., the temperature had fallen during the bathing, but immediately and strongly rose upon the substitution of the packs, reaching, upon the third day, 107.6° F., its type having become inverse.

A study of the table shows an average reduction of temperature after bathing of 3° F., a maximum of 7° F., and a minimum of .8° F.; whereas the average reduction by the packs was 2.8° F., the maximum 5° F., and the minimum 1° F. The patient recovered.

It is thus seen that the bath not only reduces the temperature, but the repetition of the bath controls it.

But the bath does much more than this. It acts upon the nervous system in such a manner as to enable it to withstand the toxic influence of the infecting principle and the products of its evolution. This it doubtless does by the action of cold water upon the peripheral nerve-endings, a reflex stimulus being transmitted to the nerve-centres presiding over the circulation, respiration, digestion, nutrition, and excretion. This general reinforcement of function is shown by improved action of the heart, the first sound continuing distinct, the pulse being slower and more regular, and the improvement of the arterial tension showing itself by the absence of diastolic murmur; by persistence of appetite and digestive power, permitting free alimentation without gastric disturbances; by maintenance of the secretions; by deepening and slowing

TABLE

Showing the immediate effect of cold baths upon the temperature during a period of six days, and the immediate effect of cold packs during a subsequent period of six days, in a severe case.

BATHS.				PACKS.			
Duration 15 minutes.				Usually one hour.			
Bath.		Before. (Degrees Fahrenheit.)	After.	Pack.		Before. (Degrees Fahrenheit.)	After.
May 26,	8	106	102.4	June 1,	1	108.6	100.8
"	4	106.4	99.4	"	2	104	100.6
"	5	104.4	101	"	8	103.2	100
"	6	105	102	"	4	103.2	100
"	7	104.6	103	"	5	104.6	101
"	8	104	102.2	"	6	105	102
"	9	105.6	104.2	"	7	105.2	102
"	10	104.4	101.4	"	8	104.6	101.2
				"	9	104.4	100.8
May 27,	11	108.8	101	June 2,	10	102.4	100.2
"	12	103.8	102	"	11	102.6	100
"	18	104	101	"	12	104	102
"	14	104	101	"	18	105.4	103
"	15	105.6	103	"	14	104.6	103.6
"	16	104.8	103.2	"	15	104.6	103.2
"	17	105.2	102	"	16	104.4	102.4
May 28,	18	105.6	103.4	June 3,	17	104.2	102.8
"	19	103.8	102	"	18	105.2	103
"	20	104.6	100	"	19	103.4	100
"	21	102.6	101.8	"	20	103.6	101.2
"	22	105	102.6	"	21	107.6	102.6
"	23	105.6	103	"	22	104.8	102.4
"	24	105.4	103.2	"	28	105.2	103.4
"	25	105.4	102.8				
May 29,	26	105.2	103	June 4,	24	104.4	102.4
"	27	105	102.4	"	25	104.4	100.6
"	28	104.6	102.4	"	26	104.4	101.2
"	29	102.4	101.4	"	27	105	101.4
"	30	103	102	"	28	104.6	102
"	31	103	101	"	29	103	102.4
"	32	105.2	100.6	"	30	105.6	102.8
"	33	105.4	102.4	"	31	105.2	102.6
"	34	105.2	101.8				
May 30,	35	105.2	102.6	June 5,	32	104.4	100.6
"	36	104	102	"	33	103	101.2
"	37	104.4	103	"	34	103.2	100.6
"	38	104.2	100	"	35	102.6	99.2
"	39	103.8	101	"	36	103.2	101.2
"	40	104.6	100.4	"	37	103.6	101
"	41	104.8	101.2	"	38	105.2	100.2
				"	39	105.4	102.6
May 31,	42	105	100.6	June 6,	40	104.4	101.6
"	43	103.6	100	"	41	103	101.2
"	44	104.6	100	"	42	103	101
"	45	103.6	100.4	"	43	104.6	102
"	46	105	101	"	44	103.6	100.6
"	47	105.6	101.6	"	45	103.8	101.8
"	48	104.6	101				
"	49	103.8	100.4				

of the respiration ; by the absence of serious nervous symptoms, except in grave cases ; the prevention, to a great extent, of complications, and the rapid convalescence.

Every attempt to deviate from the routine treatment as above laid down is followed by less satisfactory results ; hence it is carried out methodically in the wards.

In this connection there is one point to which I desire especially to call your attention, namely : The systematic treatment by cold baths, useful as it is when instituted in the beginning of the disease, favorable as it is in comparison with other methods when instituted as late as the middle of the second week, is not applicable to severe cases that have been neglected or treated by other methods until late in the course of the attack. I have recently directed the house physicians to submit to this treatment no patient admitted after the fourteenth day.

Let us now apply to the results of our treatment the second of our tests, namely, its influence upon the death-rate.

I do not propose to occupy your time with a consideration of the large mass of statistical evidence which is available. A study of the death-rate in the principal hospitals of Great Britain, Europe, and the United States, prior to 1884, shows a mortality varying between sixteen and twenty-five per cent. ; between 1884 and 1887, a period during which a mixed expectant-symptomatic and antipyretic treatment prevailed, the mortality was greatly reduced, ranging between eight and sixteen per cent. That the modifications of the expectant-symptomatic method, brought about by the use of antiseptics and antipyretics, have not, however, greatly reduced the death-rate in general practice is shown by the fact that in Philadelphia, during the year 1889, there were returned to the registry office of the Board of Health forty-six hundred and thirty-one cases, with seven hundred and thirty-six deaths, a mortality of fifteen and nine-tenths per cent. An analysis of the results of similar plans of treatment as carried out in several of the principal hospitals of Philadelphia, during the year 1889-90, shows a mortality ranging from nine and seventy-five hundredths per cent. to twenty-six per cent., the average being thirteen and twenty-nine hundredths per cent.

What have been our results in this hospital under the new treatment ? The cases may be grouped in three series :

1. February 1 to July 15, 1890, under my service, forty cases, no deaths ; average number of days in the hospital, thirty-six and nine-tenths.

2. July 15, 1890, to February 1, 1891, service of Dr. Trau and

Dr. Wolff, fifty-four cases, one death;¹ average number of days in the hospital, thirty-eight and two-tenths.

3. February 1 to June 1, 1891, under my service, sixty-six cases, seven deaths;² average number of days in the hospital of the non-fatal cases, twenty-six.

Total cases in sixteen months, one hundred and sixty; total deaths, eight; five per cent.

In the entire series of cases relapses occurred eleven times; multiple relapses, once. The average number of baths in each case of the first series was forty-two; the smallest, ten; the largest, one hundred and thirty-eight.

Among the recent contributions to this subject is a paper by Dr. F. E. Hare,³ based upon an analysis of the cases occurring under his care in the last five years in the Brisbane Hospital, Queensland. He states that during the period of August 1, 1885, to December 1, 1886, there were treated in the hospital five hundred and eighty-six cases of enteric fever. The treatment during most of the time was merely expectant, although during the latter part of the period quinine was freely used in antipyretic doses; not more than two or three cases were bathed, but cold sponging was frequently used, and in cases of high

¹ This patient died on the forty-fifth day after admission and three weeks after the temperature had fallen to normal. The autopsy showed chronic nephritis and atrophy of the intestines.

² This group of cases occurred during a very general and severe epidemic of enteric fever in Philadelphia. The fatal cases were as follows:

1. C. S., male, æt. twenty-four, baker, admitted February 28, fourteenth day of attack, died March 10, of intestinal hemorrhage.

2. T. K., female, æt. twenty-six, domestic, admitted March 9, tenth day of attack, died March 15. The temperature-range in this case was extremely high, and the attack was complicated by croupous pneumonia of the right lung.

3. S. P., female, colored, æt. twenty-five, domestic, admitted March 7, sixth day of attack, died March 19; double parotitis; acute arthritis of the knees and ankles; albuminuria from the beginning.

4. J. R., male, æt. seventeen, plumber, admitted March 18, — day of attack, died March 29; three days after admission suffered from intestinal hemorrhage, which was followed by peritonitis.

5. M. S., female, æt. nineteen, admitted March 8, eighth day of attack, died March 31; pneumonia of the right base; acute double otitis media.

6. C. S., æt. twenty-two, waiter, admitted April 15, — day of attack, died April 22. Five days after admission, this patient had intestinal hemorrhage, which recurred from day to day until death.

7. L. P., æt. sixteen, laborer, admitted March 24, fifteenth day of attack, died March 30.

³ The Practitioner, March, 1891.

temperature the cold wet sheet. Of these five hundred and eighty-six cases, eighty-five died, a mortality of fourteen and one-half per cent. This death-rate corresponds very closely with the mortality percentage of the Brisbane Hospital for the period extending from May 15, 1882, to December 31, 1886, with eighteen hundred and twenty-eight cases and two hundred and seventy-one deaths, a mortality of fourteen and eighty-two-hundredths per cent.

For three years subsequent to December, 1886, the cold-bath treatment was systematically employed. The number of cases was eleven hundred and seventy-three; of these ninety-two died, a mortality of seven and eighty-four-hundredths per cent. In other words, under the bath treatment there was an improvement in the hospital mortality amounting to almost fifty per cent.

Dr. Hare concludes that the treatment has no effect upon the occurrence of perforation or hemorrhage, one way or the other, but it renders the latter slightly less dangerous.

Bouveret¹ has recently reported one hundred cases with a mortality of three per cent. Of the ninety-seven cases in which recovery took place, relapse occurred in ten, while complications arose in no less than twenty-five. In the three fatal cases treatment was instituted on the tenth day of the attack in the first, on the eleventh day in the second, on the twenty-eighth in the third. The average duration of the fever in the ninety-seven cases was thirty-six days.

You perceive that the testimony in regard to the results of the treatment of enteric fever by systematic cold bathing, as established by the second test, is conclusive. There can be no doubt that this treatment, rigorously carried out, is capable of reducing the mortality in ordinary hospital practice at least fifty per cent. In German military practice, where the patients occur in a picked class, consisting of young male adults of previous good health, and living under favorable sanitary conditions, and where they come at once under medical observation, the death-rate is reduced to scarcely two per cent. Reflect for a moment that enteric fever is the great fever of our civilization, that its victims are found almost exclusively between the period of adolescence and the prime of life, and the importance of a treatment capable of effecting such a reduction in the death-rate, upon economic grounds alone, will become apparent to you.

The objections to the treatment come from those who have either not tried it at all, or else in a few cases only. Those who, in cases

¹ *Lyon Médicale*, April 12 and 26, and May 8, 1891.

treated by the other methods, have recourse to cold bathing late in the attack, to combat a pyrexia not yielding to internal medication, may count upon disappointment. To realize the full results of this plan, it must be instituted early in the attack in all the cases and systematically carried out. This is to be borne in mind: It is not a form of antipyretic treatment: it is a treatment directed against the disease in its entirety. Gauged by the two tests which we have mentioned, it yields results not heretofore obtained by any other method.

My thanks are tendered to the gentlemen of the house-staff, and especially to Dr. Frese and Dr. Hamann, to the Frau Oberin and the Sisters, and to my colleagues, Drs. Trau and Wolff, for an active and enthusiastic co-operation—without which success would have been impossible—in establishing this method of treatment upon a firm basis in the German Hospital of Philadelphia.

NEPHRITIS; DOUBLE PLEURITIC EFFUSION; TYPHOID FEVER.

CLINICAL LECTURE DELIVERED AT THE NEW YORK HOSPITAL.

BY GEORGE L. PEABODY, M.D.,

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New York City.

NEPHRITIS.

GENTLEMEN,—This patient is five years of age; a native of the United States. She entered the hospital on October 25. Her family history is negative; she has never had rheumatism, scarlet fever, measles, diphtheria, or any other disease which is likely to cause nephritis. For the past three months she has had dyspnoea on exertion, headache and dizziness, and has seen spots before the eyes; for the past three weeks her face, legs, arms, and abdomen have been swollen, her urine has been steadily decreasing in quantity, and her dyspnoea increasing. Her appetite is good. Her chief complaints are of dyspnoea and anasarca. When she entered the hospital her temperature was 99.6° F., respiration 24, and pulse 118. The physical signs were slight diminution of respiratory murmur at both apices behind, but otherwise there was no evidence of pulmonary lesion. The cardiac area was somewhat enlarged, and the apex-beat was in the fifth interspace 3.5 inches from the median line. No heart-murmurs were present. The heart's action was rapid, irregular, and rather tumultuous. The liver and spleen were apparently normal in size, the abdomen was distended, and there was dulness at the sides, which changed with the position of the patient; a distinct wave could be obtained from the ascites even though there was great oedema of the abdominal walls. The tongue was coated, pulse rapid and of fairly good force; there was marked oedema of the face and eyes; she was anæmic, but her general strength was fair; there was oedema of the legs and thighs. The urine, when examined, was slightly opaque, and contained a cloudy precipitate on boiling; was of acid reaction, specific gravity 1025, and contained

no sugar. There were hyaline, granular, and epithelial casts in the sediment.

You have here the important points of her history; and I wish to call attention to the fact that we have before us a case of nephritis which has become chronic in character, in a subject in whom alcohol cannot be alleged as the cause of the disease, and in whom all attempts to get at the cause have failed entirely. Whether she had unrecognized scarlatina is a matter of conjecture. I have attended a child suffering from well-marked scarlatina, and, when she was convalescent, had the mother bring to me a younger child that was not known to have been sick at all, but who was suffering from general anasarca with albumin and casts in the urine; the second child having, doubtless, had scarlatina so slightly that the mother did not notice it. We cannot determine that this child has been exposed to scarlet fever.

The urine is very scanty and we have never succeeded in increasing it to a higher average than six or eight ounces in the day. It has often been below five, but sometimes as high as ten ounces. The urine contained, when she entered hospital (estimated in the usual rough way, by boiling and seeing the relative thickness of the different layers), seventy-five per cent. of albumin; frequently it has contained ninety per cent., and it has always contained granular and hyaline casts.

It is, therefore, perfectly possible to have, especially in a young subject, a condition of nephritis in which the parenchymatous element predominates without any assignable cause; she did not get her feet wet, nor was she exposed to any of the causative diseases, and she has not been the victim of alcohol. I think we have here the so-called large white kidney, in which there is chiefly a parenchymatous nephritis with also increase of interstitial connective tissue. The reason for this opinion is that there is a very large amount of anasarca and a very small quantity of urine, containing a large amount of albumin and many casts. With the small red kidney we expect to have either little or no œdema, or ascites, and a large quantity of clear, limpid urine, containing a small amount of albumin and occasionally a few hyaline and granular casts.

The child has been treated in every way that suggested itself, with the intention of increasing her urine. At first, as her heart was rapid, she was given *strophanthus*, *digitalis*, and acetate of potassium, and the action of the skin was constantly looked after. She is kept covered by blankets, and sweats a great deal, which I believe has been largely instrumental in ridding the body of products of decomposition which

the urine is unable to carry away. After these drugs were kept up for a while, the digitalis was replaced by citrate of caffeine, and poultices were applied over the region of the kidneys. The stimulants were then stopped as her heart became somewhat infrequent in its beats and of fair force. All stimulants were stopped because we thought, perhaps, we were lessening the amount of fluid eliminated by the kidneys by causing them to be constantly over-congested. The immediate effect was an increase in the quantity of urine, greater than under any other treatment resorted to. This improvement was only temporary, and it very soon sank to the old average. On one day it went up to twenty-six ounces. The heart's action became again somewhat feeble, and we have since then given various cardiac stimulants like strophanthus and caffeine. She has had hot-water baths twice a day and diuretic mixtures. Her diet has been carefully attended to; she lives largely on milk, and from time to time has been given dry toast and weak coffee, the latter as a cardiac stimulant. An infusion of melon-seeds to increase the quantity of urine was given without effect. She has had a little meat and farinaceous food. A little paregoric was given, and I think it has aided us in our attempt to keep up a free action of the skin.

The urine has been often examined with always about the same result. On November 13 it was yellow, opaque, and acid; specific gravity 1028, and contained no sugar, but many casts and leucocytes and much albumin. That has been about the ordinary record. The examination of her blood shows that it contains but fifty-two per cent. of the normal amount of hæmoglobin, and she is apparently losing that, it having been fifty-five per cent. nine days previously. There are some of the symptoms of hepatic cirrhosis with the nephritis. The abdominal veins are enlarged, and, curiously enough, apparently terminate at the free border of the ribs, and there is a distinct amount of serum in the abdominal cavity. The thoracic and abdominal walls are very œdematous. It is an interesting fact that as the œdema of the abdominal walls increases the veins disappear from view. The veins do not end where they disappear, but are concealed from view by œdema, the epidermis being raised over them by the serum in the skin and subcutaneous tissue. Pressure on the abdominal wall may displace enough of the serum from the subcutaneous tissue to cause the veins to become more apparent.

On two occasions she has suffered much from severe dyspnœa, and so marked has been the suffering that it seemed to me necessary to give positive and immediate relief. It seemed that the dyspnœa was due to inability on the part of the diaphragm to descend because of the

distention from below upward of the ascitic fluid, and so the indications were to remove it. On two occasions she has been tapped. The last time was four days ago. The amount of fluid withdrawn differed somewhat, having been one hundred ounces at the first tapping and one hundred and six at the second. I would like you to see her thighs in order to observe the extent of the œdema. It is really a general anasarca, especially marked in the lower extremities and also in the back. After each tapping there has been considerable oozing from the wound, but I do not object to that except that it is a matter of inconvenience. If it continues a long time, it is apt to keep the bed wet and to cause bed-sores. If continuing for only a few days it is really salutary rather than otherwise. A small trocar was used for the tapping. In doing the operation we put a small amount of cocaine, about a half-grain, under the skin; with a small scalpel we incised the skin and the subcutaneous tissue, and with a thoroughly disinfected trocar we pierced the previously disinfected abdominal wall midway between the umbilicus and the symphysis pubis. There are some details of importance about the tapping. If the abdominal cavity is infected by you, very great damage may be done, but if you are careful this will not be likely to happen.

The question of the possible existence of cirrhosis has not been settled by the tapping. After neither tapping have we been able to make out any increase or diminution in the size of the liver or spleen. Cirrhosis in a child, without the previous use of alcohol or the influence of other causes, is uncommon, but it is distinctly recognized and is not to be excluded because the child has not been subjected to those causes.

It is desirable for you to understand the method of making the diagnosis of fluid in the abdominal cavity. Why might it not be an abdominal tumor or ovarian cyst, or a malignant tumor? If the fluid is free in the cavity, the hollow viscera will float on it and come to the highest point unless bound down by adhesions. Anteriorly percussion shows the hollow viscera to be present. Upon percussing below, near the thighs, the note is very dull, and in the groin is flat. Without doubt the fluid is free in the peritoneal cavity. The presence of the fluid wave is quite distinct here, which would lead you to believe that the fluid was free, although, of course, it could be felt through the wall of a very thin ovarian cyst.

The dressing of the abdominal wound is very simple. We use iodoform-gauze and apply a cotton dressing and binder outside, allowing the puncture to leak, if it will, for a few days. Occasionally in

adults, where the abdominal walls are not so cedematous, I have had obstinate leakage, an example of which occurred in this ward, a few years ago, in the case of an old woman, where the wound persistently leaked for days and days and nothing was able to control it but the insertion of silver wire sutures.

Although the child is gravely ill, she is holding her own, and appears to be in as good spirits and to feel as well as she did six weeks ago. The prognosis is absolutely bad, and on that account I do not think it justifiable to resort to any heroic method of treatment.

DOUBLE PLEURITIC EFFUSION.

The next patient to whom I shall ask your attention happens to occupy the next bed. She is a negress, twenty-two years of age, a native of the United States. She is married, and a servant by occupation.

She entered the hospital on December 4. Her mother and father died of consumption. Beer-drinking is admitted by her. She has had alopecia and is subject to sore throat. She has had malaria, but has never had rheumatism, tuberculosis, or nephritis. She had one child; born eighteen months ago. Menstruation is regular, the last occurrence having been five weeks ago. She at that time caught cold and had an attack of pelvic peritonitis which kept her from work until a week ago. She then had night-sweats, became weaker, and had cough. Last Saturday, after severe work, she had a sharp pain in the right chest and marked dyspnoea. These symptoms continued until her entrance. She has had no chill. Her appetite is poor and she has constipation. Her chief complaint is of the dyspnoea. Her temperature is 101.7° F., respiration 48, and pulse 116.

We have no history of this illness dated beyond the day prior to her entrance to the hospital,—that is, five days ago. I have cross-examined her on that point, because it seemed to me when I first saw her that the physical signs indicated that the disease must have existed longer than forty-eight hours, but she persisted in saying that she was perfectly well until she had that pain in her side. She had been working the night before, doing washing.

When she was admitted here she had a double pleuritic effusion and a displaced heart, with all of the usual accompanying physical signs and symptoms. About half-way down the back of the right chest a hypodermic needle withdrew purulent fluid. There was absolute flatness on percussion, with loss of vocal resonance and fremitus, and of breath-sounds at the level of the fluid on both sides. Purulent fluid

on the right side was found at the level of the seventh rib. On the left side the fluid was clear serum. On the 6th and 7th of December the fluid had diminished without any treatment except the punctures with this hypodermic syringe for diagnosis. I thought at first that it was an empyema and that the chest would have to be drained. Following the introduction of the needle of the hypodermic syringe the fluid sank, however, until the voice was heard almost to the bottom of the chest on both sides. The fever ceased and she has had none for the last forty-eight hours, while the fluid has almost entirely disappeared. She is now given nourishing diet and seems to be doing perfectly well.

How am I to explain the disappearance of the purulent fluid from a chest without drainage? If you have an empyema in an adult, I think it is not worth while to attempt to cure without drainage. In a young child you can always withdraw a considerable quantity of the fluid, and very often absorption of the rest seems to take place. This is not the case with an adult, and yet it seems to have taken place here. The explanation is perhaps as follows: I have often seen in the autopsy-room chests where there was a certain amount of intense pleuritic inflammation with the production of serum, fibrin, and many leucocytes. These have usually been in patients who have died of acute pneumonia, with the complication of intense pleurisy. I am not now referring to cases which at all resemble cases of empyema. If the needle entered such a chest a considerable amount of turbid fluid might be withdrawn containing pus-cells. I think the needle pierced such a collection in this case and that there was not present at any time a true empyema. I am somewhat loath to make this explanation, because the needle came away containing a fair amount of pus, but I have seen such cases and know that they do occur, as proved by microscopic examination. Unless there be pneumonia the percussion note does not always become flat in such cases, but is not quite as resonant as it would be if there were no exudation.

There is practically no fluid left in this chest. The moral to be drawn here is, not to be too hasty in operating, and under no circumstances to do paracentesis thoracis without having found pus present immediately before the operation. There are too many chances for error to make it safe to open a pleural cavity without your being absolutely certain that pus is there.

Here is something puzzling. This heart is still displaced upward, but not so much as it was. It can be felt in the fourth intercostal space, but is most distinct in the third. No murmur is present and the heart-sounds are clear. I think that this displacement of the

heart has nothing to do with the pleurisy. It may have been bound down by old pleuritic adhesions, and I think that it was displaced before the present illness, for there is nothing in the latter to cause such a displacement.

The treatment was at first stimulating, because the pulse was very rapid and feeble, and it seemed to be rather an urgent case. I ordered, when she entered, that if in the night the dyspnoea was very great the fluid should all be withdrawn by aspiration. She was given digitalis and whiskey. Lying in bed quite relieved her of the dyspnoea, and her treatment since has been merely by cardiac stimulants. Her pulse is now of good quality and proper frequency, and she will soon be ready to return to her work.

TYPHOID FEVER.

The next patient to whom I shall ask your attention has been in the hospital several weeks. He is aged thirty-three, a native of England, married, and a clerk by occupation.

He entered the hospital on November 24. His family history is negative. His use of alcohol is moderate. He had syphilis five years ago. He gives no history of tuberculosis, malaria, or nephritis. The present illness began a month ago with headache, general malaise, and prostration. These symptoms continued until ten days ago, when he felt worse and had pain in the abdomen. He had several attacks of epistaxis, with fever but no chills. He did not vomit. He had at first diarrhoea, but for the last five days his bowels have been regular. He has had a cough, with mucous expectoration, and a slight sore throat. His chief complaint is of weakness with fever. Upon admission his temperature was 103.4° F., respiration 26, and pulse 116. This patient seems, as you all will agree, to be suffering from typhoid fever. A prodromic history of a month is too vague for us to allow as bearing upon the diagnosis. He entered the hospital about the eleventh day of his disease.

He was given the cold bath immediately. The baths are at first given at a temperature of 70° F., and, if borne well (which they usually are), the next one has a temperature of 65° , and this temperature is not again departed from. They are given as often as the patient's temperature reaches 102.5° , the idea being to keep him somewhat apyretic and to prevent fluctuations of temperature. The temperature, after the bath, dropped much less early in the treatment than later, and after three days the indication of 102.5° was not present; then for three days no tub was given, and he has needed none for a

week. To-day his temperature is 102.6°, and the tub is needed at the present time, and I am glad you are here to see the method of using it. He has been more seriously ill than most of the cases in this epidemic. As the epidemic draws to a close we are having more serious cases than at the beginning. We have had two hemorrhagic cases in the last week. This man's pulse has not been very good, owing perhaps to his being quite fat and flabby. It is, however, not a very bad pulse. He has a slight eruption which is now fading very rapidly. One other important symptom is the meteorism. There has been considerable abdominal distention, for which turpentine in fifteen-minim doses in emulsion has been given with decided relief. His tongue is moist and somewhat coated. The specific disease of the throat, of which he gives a good history, still exists. There are some slight ulcers on the tonsils which have been diminished under the use of a very weak bichloride gargle and are now mere erosions.

The only other treatment has been in the way of feeding and stimulation. He has been given extract of malt with milk as food, and is given one minim of fluid extract of digitalis every three hours, with a large amount of whiskey because he has been accustomed to it. Measure the amount of whiskey by the amount the patient has been getting before the illness, and the effect which it produces. He has been getting between six and seven ounces every day, as a rule. Besides that and the bath, cold compresses have been used continually when his temperature went above 100°. The compresses are wrung out of iced water and placed over the chest and abdomen in order to keep up the effect of the bath. His mouth has been frequently washed out with a mixture of listerine and glycerin. The former contains a number of aromatics and disinfectants, oil of winter-green being a prominent ingredient. Just before he takes a bath he gets usually a half-ounce of whiskey, sometimes a little being given just after the bath also. He is kept in the tub ten minutes. It is important that the patient should not make any exertion. Pretty active friction is kept up over the extremities and the body, excepting the abdomen, during the bath. The object of this is twofold: it increases the patient's comfort and brings an increased amount of blood to the surface, so increasing the heat-radiation, thus making the bath more endurable and more efficacious.

Our routine method in the first week of the disease is to begin with a dose of calomel, and then immediately, unless there are distinct contraindications, to follow this with the bath treatment. The bath is given when the patient's temperature is above 102.5°. In some ob-

stinate cases I have given it sixteen or seventeen times in twenty-four hours. Usually the maximum number is about eight. As a rule, it lowers the temperature more markedly late in the disease than early, improving the general condition, the pulse, and the condition of the sensorium. Such patients are rarely delirious and are less likely to have albuminuria and to suffer from profound prostration than are patients that are not bathed. Another part of the routine treatment is the keeping of these cold compresses over the chest and abdomen in the intervals of the baths so long as the temperature is above 100° F. It is a good plan and increases the heat-radiation from the surface of the body. Patients with fever are not likely to catch cold. If we cover them with a sheet only, the fever prevents them from taking cold and the scant covering tends to allow heat-diffusion to go on constantly, and so renders the disease somewhat milder. In some cases, when they come out of the bath, they feel very cold, and hot bottles to the feet, and blankets, may be required. We prefer to cover them with a sheet and allow the moisture to evaporate. Many cannot stand this, and then we do not persist in it, but wrap them in blankets. While they are in the bath, do not rub the abdomen, because there are ulcers there which are not healed and which will do better if left alone. Our patient has now been in the bath for ten minutes, and we will remove him. The pulse is apt to become a little smaller, but often becomes slower and of better character. He is now given hot milk containing extract of malt. The latter is a very digestible form of dextrine, and I have been giving it to my fever patients for a number of years. His pulse is now a little more rapid and a little smaller, but still of good character and does not call for any special treatment.

Some like the baths, but others dislike them very much, and when the antipathy is very pronounced, we must yield to it occasionally, but very rarely, and abandon this method of treatment.

I have now treated quite a large number of cases by this method of systematic bathing, not only here, but in St. Luke's and Bellevue Hospitals. So far as my material will allow of conclusions being drawn, I may say to you that I am much pleased by the results that it has given, even in bad cases. The earlier it is begun, and the more systematically it is carried out, the better are the results.

THE PATHOLOGY OF ANGINA PECTORIS.

A LECTURE DELIVERED AT THE LONDON HOSPITAL.

BY ARTHUR ERNEST SANSOM, M.D., F.R.C.P.,

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PROCEEDING by the logical method of exclusion, we have considered in previous lectures those forms of pain which are referred to the heart, but which have an origin in affections of the stomach, or of the surrounding nerves, in inflammatory affections of the pericardium, in diseases of the aorta (aneurism, etc.), or in disturbances of the rhythm of the heart.

We now proceed to consider the disease known as ANGINA PECTORIS. I shall define this as *a paroxysmal affection, characterized by severe pain, sometimes amounting to anguish, felt in the region of the heart, but with radiations to various other situations, and a sense of oppression, attended with fear of impending death.* The points that we will consider in the first place are these: The attack is paroxysmal. It may be repeated, and often is repeated, at uncertain intervals. Occasionally death occurs in a single paroxysm. It is always of very serious significance.

We will now consider the observed paroxysm. It is not very frequently that the physician has the opportunity of witnessing this. On the occasions on which I have observed it throughout its course I have seen that, first, there is on the part of the patient an arrest of movement; he becomes motionless, and often supports himself by his hand against some obstacle, as a chair or other article of furniture. A look of extreme pain, or anguish, is observed upon his countenance. There is generally an arrest or retardation of respiration. Over the face there spreads a wave, as it were, of pallor or lividity. The patient so remains in extreme suffering for some time, it may be a few seconds or minutes, and then, with a sigh of relief, the attack

passes away. On one occasion I have witnessed the concentrated anguish end in death.

We will now consider the characters of the pain as described by the patient. For this purpose I propose to take the evidence of thirty-eight cases, of which twenty were those treated in this hospital, taken from the records by Dr. F. J. Smith, the medical registrar, and eighteen cases personally observed by myself. Of these the great majority referred the maximum of their sufferings to the præcordium. In many the pain was localized over the sternum, generally the mid-sternum, but in some at its upper part, and in others at the junction of the third, fourth, and fifth costal cartilages on the left side. In one it was localized at the second left interspace. I think I may say that, in the majority, the chief site of pain was very nearly over the situation of the arch of the aorta. In a few it was placed in the mammary region, and in some in the thorax generally and at the epigastrium. In two of the cases the sense of suffering distinctly extended to the throat, in many others down the left arm to the finger-ends, involving the left shoulder, especially the region of the scapula. In one case it was as of a long sharp instrument stabbing all round the heart and down the left arm. In one case it was occasionally down the right arm, and in another in both arms, "as if these were screwed out of their sockets." Other observers, in addition to the sites of pain I have mentioned, have noticed currents, as it were, to the lower jaw and occipital region, and down the abdomen, involving the testicles. In all the cases, so far as I am able to infer, there was a sense of impending death; in some there was a feeling as if the heart tended to stop. One described it as "a fearful stoppage," and some were conscious that the respiration was arrested.

We may now inquire whether it is possible, and again whether it would serve any useful purpose, to make a classification of the forms of suffering which I have just enumerated. In my opinion, such classification is not only practical, but useful. I would divide the sufferings into (a) the acute pain, having the character of neuralgia, and (b) the sense of constriction, or stoppage of heart and respiration, with the feeling of impending death. So far as class *a* is concerned, the situation of the acute pain may roughly be said to be the aorta and its neighborhood, with radiations in the directions I have mentioned. It would appear to me most probable that the course of the conductors of painful impressions is by the way of the fibres of the sympathetic nerve. I would adduce as an argument in favor of this view that the pain has a strong analogy, or similarity, to that of hepatic or renal

colic, in which cases it cannot be doubted that the fibres of the sympathetic are primarily irritated.

I have shown you that pain, having many of the characters of angina pectoris, is occasionally manifested in inflammatory affections of the pericardium, and also sometimes in aneurism of the aorta. I have further described a case in which we were able to trace the signs and symptoms when an abdominal aneurism burst between the coats of the vessel and did sudden violence to the structures around. In that case there was an attack having all the features of an epileptic paroxysm, the patient on recovering consciousness evincing expressions of the most excruciating pain, which was annulled by the administration of chloroform, such administrations being kept up at intervals for more than twelve hours, any recovery of the patient during that period from the anæsthetic sleep being attended with evidences of extreme pain. If we agree that the sympathetic nerves are the carriers of impulses which result in painful impressions, we must conclude that these impressions are reflected from the centres, not only by the sympathetic fibres themselves, occasioning the pain referred to the region of the aorta, to the epigastrium, to the testicles, etc., but also by the nerves of ordinary sensation down the arms, occasioning, as in one case I quoted, that feeling of wrenching of the arms almost resembling the effect of an electric shock.

We now turn to *b*, including the sensations of constriction at the præcordium, the sense of arrest of the beating of the heart, and the feeling of impending death. This, I consider, may be referred to an implication of the vagus nerve. The evidence in support of this is derived from the experimental investigations which have shown the phenomena of inhibition of the heart, which are so well known, and also by the recorded effects in a few cases where the vagus nerve during life and health has been susceptible of irritation.

It is well known that Professor Czermak, who had an exostosis on one of his cervical vertebræ, was able to compress the vagus nerve between his finger and this exostosis, and could so strongly stimulate the nerve as to stop the action of the heart, producing at the same time a feeling of constriction, or, as it has been called by the Germans, *Beklemmung*.¹

Another evidence is in a case recorded by Romberg. The patient, a man aged thirty-six, after a prodroma of apprehension and terror,

¹ Lettsomian Lectures on the Disorders of Digestion, by Dr. T. Lauder Brunton. Macmillan & Co., 1886, page 30.

felt his heart stand still. There was an intermission of from five to six beats. At the same time he experienced violent pains on both sides of the chest, extending to the neck and head. Death occurred, and at the post-mortem examination the great cardiac nerve was found very distinctly diseased, and the left vagus, as well as the phrenic, involved in diseased glands.

These two varieties of affection—that is to say, the sympathetic and the vagus implications—are generally combined in an attack of angina pectoris, but they are sometimes dissociated. In one case of mine the painful affection at the cardiac region was present in a minimum or almost inappreciable degree, while the vagus symptoms were exceedingly pronounced. There was an arrest of the heart and a temporary loss of consciousness. In this case the attack was mortal. In another case, that of a lady, aged forty-two, there was at one period of the malady extreme pain, extending from the præcordium to the left arm and to the finger-ends, the diagnosis of angina pectoris being made by one of the most competent observers in London, and then two years afterwards a very different form of attack, characterized by a tendency to arrest of heart's action, without the pain, but a feeling as of suffocation. This case is still under observation.

It would seem to me, from the arguments that I have adduced, that we may legitimately divide an attack of angina pectoris into these two categories. The *angina vaso-motoria*, described by Nothnagel, is probably associated with what I may term the vagus variety, these being characterized by coldness, pallor, stiffness of the limbs, oppression, a sense of impending death, the pain not strongly marked, but some dull aching being felt in the cardiac region.

We come now to consider the most notable conditions at the time of the attack. Of these the most important are those of the arteries. It has generally been agreed that at the time of an attack of angina pectoris the arteries are in a condition of *high tension*, and this has been emphasized by the extremely important and valuable observations of Dr. Lauder Brunton, who has shown that the inhalation of nitrite of amyl, an agent which has the power of relaxing the tension of the arteries, relieves, and even annuls, an attack of angina pectoris. Testimony tending to a similar conclusion has been brought by Dr. Murrell, who has employed nitroglycerin administered internally for the same purpose, that drug having a very similar action. It behooves us, however, carefully to consider what is meant by the expression “high tension” in the arteries, and what are the particular signs observed, so far as the arteries are concerned, during an attack of angina pectoris. The

expression "high tension" is open to considerable animadversion. In cases of aortic insufficiency, in which there is the typical water-hammer pulse, there may be a condition of extremely high tension, but this is extremely brief. The concussion, as it were, of the vessel on its internal surface is extremely short. There is *high* tension in such a case, but not *sustained* tension. What has generally been understood, however, as a distinct feature of angina pectoris is that there is protracted or sustained tension. It is, of course, not very often that the physician is able to make very accurate observations concerning the tension of the pulse at the very moment of extreme peril of an attack of angina pectoris. In some cases, however, this has been possible, and in others the observer has found not very considerable differences to exist between the pulse observed just before and just after the paroxysm. So far as I have been able to obtain accurate evidence, I have divided the characters of the radial pulse, as observed during angina pectoris, into three types.

In type 1 there is the typical water-hammer pulse of aortic regurgitation. At the time of the attack the rate is more rapid than previously, the amplitude of the sphygmographic trace extremely high, the sudden tension, therefore, within the artery extreme. This would imply a powerful action of an excited left ventricle, impelling the waves of blood with violence into the artery, the vaso-motor conditions in which may or may not differ from the normal.

In type 2 the artery is tense, and the action of the heart powerful. This is attested by a fair amplitude of the trace, an extremely prolonged blood-wave, and absence of dicrotism. This implies a strong, vigorous left ventricle antagonized by constricted arteries, which are evidently in a state of vaso-motor tonic spasm.

In type 3 there is simply a rise and fall in the sphygmogram, showing no characters, except those of, as it were, one wave thrown into the vessel, and having a strong resemblance to the traces seen in many cases of aneurism. This was the form of pulse-trace figured by Dr. Lauder Brunton in his original paper on "Nitrite of Amyl in Angina Pectoris,"¹ during the extremity of the pain. In this type it cannot be contended that the action of the left ventricle is strong. The evidence shows that there is vaso-motor tonic spasm, so that the arteries are constricted, but the evidence points strongly to the conclusion that the action of the left ventricle is by no means powerful, but, on the contrary, feeble.

¹ Clinical Society's Reports, vol. iii.

We will now turn to the MORBID ANATOMY of the affection. The most important signs, I think, can be divided into two classes. In Class A, which includes the minority, no morbid change whatever is to be detected. In one case, that of a young man of twenty-three, the fatal attack seemed to have been induced by a sudden exposure to cold. In another, over-exertion in running was attended by the signs of angina pectoris and death. In this case the cavities of the heart were found almost empty, except the right auricle, which was enormously distended. But in this, as in other cases, there was no notable change whatever in the muscular fibres of the heart.

In the second class, Class B, the important point noticed was obstruction of the coronary arteries. It cannot be doubted that, in a large number of cases,—one hundred and twenty-three of such cases having been collected by Huchard,—obstruction of the coronary arteries was observed, generally on account of atheroma. In most of these cases the heart-fibre was observed to have undergone degeneration, no doubt in consequence of the obstruction to the circulation, and it may well be that this degeneration was a cause of the fatal result, although it is by no means to be concluded that it had any causal relation with the attacks of angina pectoris. It cannot be doubted, however, that there is some relation of causation between the condition of atheromatous or other change and the observed phenomena of angina pectoris. It behooves us to investigate what this relation is. Before doing so, I will take the clinical evidences in my own cases. In these there was disease involving the aortic orifice or the aorta itself in twenty-one cases. In fourteen there was aortic insufficiency, and in ten of these the clinical evidences of some aortic regurgitation coexisted. Stenosis of the aortic orifice was observed in twelve cases. In the absence of aortic disease there were evidences of hypertrophy and dilatation of the heart in eight cases. There were no special signs referred to the heart in six cases. In one of these the arteries were hard and incompressible. In one case there was rheumatism and in another case epilepsy.

I propose now to consider the question, How is an attack of angina pectoris brought about? We will take this first in the case of the apparently healthy. These are a small minority of all the cases, but, so far as our evidence goes, there may be a typical and fatal attack of angina pectoris occasionally in the young and apparently healthy, the determining causes being sometimes exposure to cold, sometimes muscular overstrain. In such it can scarcely be doubted that there is some particular predisposition; that just as in certain cases there may be

very rapid action of the heart without suffering, while in others a much less rapid action of the heart is attended by signs of grave distress, so in some the nerves which are concerned in the ordinary rhythmic regulation of the heart may be more sensitive to impressions of pain and distress than in others. In such cases, therefore, there must be some predisposition.

We turn now to the majority of cases, those in which there is a condition of previous disease. In the great majority of these, as we have seen, there is evidence of obstruction of the coronary circulation through atheromatous disease. Now in a few cases recorded by Lancereaux, by Peter, by Bazy, and by Romberg, there has been distinct involvement of the sympathetic nerve fibrils in the neighborhood of the aorta in disease. These are in a condition of inflammatory change, neuritis, and it can be only reasonable to suppose that they are ready to become the carriers of abnormal and painful impressions. It may be asked why, in such a case, the resulting affection should be paroxysmal and not constant; to which the answer would be, the analogy of disease within the cranium producing a constant pressure upon the gray matter of the brain, and yet the expression of which has been epilepsy. The explosion takes place at intervals only when the conditions have arrived at a certain intensity. It seems to me extremely probable, therefore, that in the majority of cases of angina pectoris the attack is brought about, not because there is an obstruction of the coronary circulation, but because the atheromatous process has involved the sympathetic nerve-fibrils, and the resulting degeneration of the heart-muscle is a cause rather of the fatal result than of the paroxysm itself.

I consider, however, that there is a third group of cases to be taken into account in which the conditions are not those of health, as in the first group, nor those of atheroma, as in the second, but where there has been an antecedent rheumatic affection. In the case recorded by Dr. Lauder Brunton, which has been cited, it seemed to be significantly stated that the anginal attacks did not occur while the patient was suffering from the pains of acute rheumatism, but did occur when the pains had entirely ceased. I have had cases exactly pointing the same lesson. In a man of forty-nine, admitted under my care in November, there was an attack of rheumatic fever in the spring, lasting about three weeks. He recovered good health until the end of September, when slight heart-pains became manifest. Soon afterwards he developed typical signs of angina pectoris. The explanation which I am inclined to think probable in such cases as these is as follows: during

the attack of acute rheumatism, and the whole of the period in which there is general fever, the tension of the arterial pulse is low; but, though all fever has ceased, it by no means is to be concluded that inflammatory changes are not going on in the endocardium and its neighborhood. Long after the attack of rheumatic fever the endocardium and the structures in its neighborhood are undergoing inflammatory changes. I have seen at considerable periods after the subsidence of an attack of acute rheumatism the aortic valves and the structures about the root of the aorta infiltrated with cellular elements. It would seem quite probable that in such cases the sympathetic nerve-fibres, in such close proximity, may be implicated in the inflammatory change, that, in fact, a neuritis may be developed in these. So they become the conductors of abnormal or painful impressions. It is very difficult to understand why a condition of vaso-motor tonic spasm should be essential to the production of the painful form of angina pectoris, but it is to be remembered that such tonic spasm of the arteries is a concomitant of many forms of pain. It has been observed in gout, in hemicrania, in some forms of neuralgia, and in lead colic, as especially shown by Dr. Thomas Oliver.

It would seem, therefore, that for the production of the *ensemble*, which we term angina pectoris, there must be a condition giving rise to an exaggerated conduction of impulses by the sympathetic filaments or by the vagus filaments, or by both, in the neighborhood of the heart, to the cerebral centres; that there must also be such an affection of the vaso-motor centre as to superinduce a tonic spasm of the arteries, an exception possibly being in cases of aortic insufficiency, where a violent shock to the interior of the artery may be sufficient to produce the irritant effect. The attack of angina pectoris may be considered as a commotion in the cerebro-spinal centres, involving the sensory area, the vagus area, and the vaso-motor area.

CHRONIC DIFFUSE NEPHRITIS.

CLINICAL LECTURE DELIVERED AT THE HOSPITAL OF THE UNIVERSITY OF
PENNSYLVANIA.

BY JAMES TYSON, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania.

GENTLEMEN,—The patient I present to your notice is a colored woman forty years of age, a domestic servant in a private family. She has been under treatment for some time before admission, and her case is a very interesting one. She has been treated for heart-disease, and was admitted to this house under the impression that this was the ailment from which she suffered. Upon examining her, however, we were unable to find any signs of valvular disease of the heart, although there was some irregularity in its action. But there is a swelling of the legs, pitting on pressure, said to have been much worse than it is at present. Under its influence the skin has given way and ulcers still persist, although the rupture first occurred last July.

In the absence of distinct evidence of heart-disease the urine was examined, and by this investigation we found, as I believe, the cause of her trouble. I have some of her urine here, and will examine it in your presence. The first test we will make will be the simple heat-and-acid test, as it is commonly called. The test-tube which I have here is inconveniently large; it is desirable not to have too large a tube, because the larger the tube the longer is the time occupied in boiling the urine, and, as time is always an important factor, this is to be considered. I always use for my own practice test-tubes with flat bottoms. They are particularly convenient, because with them you can measure the bulk of albumin more accurately. This is further aided by having them graduated in equal spaces. At once, on the application of heat nearly sufficient to boil, a precipitate occurs. This precipitate is not dissolved on adding nitric acid. It is therefore albumin. It is ascertained also that the reaction of the urine is acid, and its specific

gravity 1012, which is lower than I had expected from its color; and I call your attention to a further deepening of the color of the urine on adding the acid after boiling. This shows an undue proportion of coloring matter, probably the result of a feverishness which is also present in the patient. Now, although we find a large albuminuria and dropsy, we dare not make a diagnosis from these data. Not every case of albuminuria is a case of Bright's disease. It has been many years since such a view dare have been excused.

A microscopic examination is next necessary, and this instrument reveals, first, a few blood-disks, not sufficient, however, to impart their color to the urine. Second, we at once recognize numerous casts of the uriniferous tubes. The material of these tube-casts is very commonly a basis of some albuminous, coagulable material derived from the blood. Now, this material in the act of coagulating—in the act of solidifying—will entangle whatever happens to be in the tube at the time. If there happen to be tolerably complete epithelial cells these are caught and produce an epithelial cast. If the cells are broken down into granular material they produce granular tube-casts, which may be dark or pale granular, according to the amount of granular matter. Again, a tube-cast will be perfectly transparent or hyaline. This occurs, on the one hand, when there is nothing in the tube to become entangled, or, on the other hand, when the epithelium is so firmly attached to the tube that it cannot exfoliate. In the former case the casts are broad and in the latter narrow, as also when the tubules are shrunk or contracted. Again, there are what are called waxy casts. These may possibly consist of epithelial cells which have undergone conversion into glistening waxy material. Another form of cast is produced, again, when blood-disks become entangled, and these are known as blood-casts. When oil-drops are similarly caught, oil-casts result.

Let us consider for a moment the significance of tube-casts. The simplest form of cast is the hyaline, which has least significance. Epithelial casts are found in the urine in acute nephritis, granular casts in subacute and chronic nephritis, and oil-casts in chronic nephritis of the tubal or parenchymatous or diffuse variety. Narrow hyaline casts are found in chronic interstitial nephritis, but may occur in any form of Bright's disease and in simple congestion of the kidney. Blood-casts are most commonly found in acute nephritis, but blood-disks are found in chronic varieties as well as in the acute form. In the present specimen there are, in addition to a few blood-disks, hyaline casts, dark granular and pale granular casts, the *débris* of renal cells variously degenerated. There are also some oil-casts. The patient has been ill

for many months. From these facts I do not hesitate to declare this a case of chronic parenchymatous or diffuse nephritis, although it is not always an easy thing to draw the line between chronic and acute nephritis. This is certainly more than an acute case. There are no blood-casts and no epithelial casts. On the other hand, we have large albuminuria, dropsy, dark granular and oil-casts. I do not hesitate to declare it chronic. It is, further, a case of what is known as parenchymatous inflammation, in which there is always more or less overgrowth of interstitial connective tissue. Hence the term *diffuse* nephritis, often employed, is a better one. The kidney after death will be found larger than in health, the cortex, particularly, is widened, and the organ white and mottled. The whiteness is the result partly of a fatty state of the cells and partly of an anæmia due to the compression of the small blood-vessels by the swollen tubules.

The prognosis, but for the complications, need not be so very unfavorable. I have seen great improvement occur in such cases; no cures perhaps, but still such a state of affairs that the patient, from the total absence of subjective symptoms, has regarded himself as well, while an examination of the urine would still discover albumin. Under favorable conditions I should expect that we could do a great deal for this woman.

As to treatment, for a case of chronic parenchymatous nephritis, the indication is, of course, to restore the kidney to its original structure and function. The former I regard as impossible, the latter, as I have intimated, is possible. But while we may not be able to restore the normal structure of the organ, we may do that which will arrest the retrograde process. The original cause of the tubal inflammation was undoubtedly some substance in the blood acting as an irritant on the renal cells. It may have passed away, but the irritable condition induced remains. Its removal is favored by diminishing the work thrown upon the kidney. This may be accomplished in various ways. First, by the use of food containing a minimum of substances secreted by the kidney. It is not possible to subsist upon food which contains no such elements, but it may be approximated and health remain. Nitrogen is the most important of these elements, and urea, the ingredient of the urine in which it is principally removed, is at once the most abundant and most irritating constituent. Nitrogenous food should therefore be cut down. Hand in hand with the nitrogen of such food go the salts found in meats,—viz., the chlorides, phosphates, and carbonates of potassium,—all of which are eliminated by the kidneys and irritate these organs in the course of their elimination. The

type of such disallowed food is animal flesh and blood, together with the various beef extracts and beef essences. On the other hand, milk, which contains less than one-fourth the proportion of nitrogenous substance contained in meat, bread, which contains half as much as meat, potatoes, rice, indeed, all grains and vegetables are less harmful, containing as they do a larger proportion of starches, sugars, and fats. In like manner, butter and the fat of meats, where it can be digested, are not contra-indicated, while the albumen of eggs, representing almost the type of nitrogenous food, should be sparingly used. The yellow of eggs, on the other hand, is less objectionable because of the larger proportion of oil, and a mixture of the yolk of hard-boiled egg, bread-crumbs, and butter is a favorite allowance of mine in chronic Bright's disease. Of course, the degree of restriction must depend somewhat on the requirements of the individual case, and experience has taught us that, in the majority of cases, a sort of medium course results more satisfactorily than one which excludes the largest possible proportion of nitrogenous food.

The lessening of the work of the kidney is also favored by stimulating the action of the skin and bowels. I will not dwell on the numerous methods by which this is accomplished, but mention in passing the effect of warmth in bed, woollen underclothing, and residence in warm climates as agencies, the continuous effect of which is often more effectual than the necessarily limited action of medicines and measures like hot baths and diaphoretics, which act more vigorously upon the skin but which cannot be continuously used. The usual means employed to act upon the bowels may all be utilized as convenience or exigencies determine.

After these indications are fulfilled further treatment depends upon circumstances. If there is dropsy, the measures above described will favor its removal, while rest in bed is a powerful adjuvant, indeed scarcely to be dispensed with in any case. But these may not be sufficient, and diuretics may be demanded. Of these undoubtedly the best is digitalis. It should be used in full doses of any one of its preparations, though the tincture is probably the most convenient and the fresh infusion the most efficient. Less than fifteen drops or seven and a half minims of the former, three times a day or oftener, for an adult are scarcely sufficient, while two fluidrachms of the infusion may be considered as the minimum dose for such purpose. The effect may be increased by the addition of full doses of the citrate or acetate of potash, while other modifications will suggest themselves to the physician. The objection to digitalis is that sufficient doses sometimes

nauseate, and it has often to be suspended on this account. There is something peculiar about the vomiting of digitalis by which it may often be recognized, and that is a suddenness in the act of vomiting. When digitalis fails, or has to be suspended, *strophanthus* may be substituted, although it is a much less reliable drug. The minute doses used when this remedy was first introduced are altogether insufficient. Five drops or two and a half minims of the tincture is the minimum dose for an adult, and it should be rapidly increased to ten drops or five minims¹ and more. These remedies, it is well known, act by augmenting the arterial pressure in the kidney, and therefore increase the "watery" portion of the urine rather than the solids, although the latter are also somewhat increased.

Other diuretics I have learned to rely upon as the result of further trial in the last two years are *sparteine*, the active principle of broom or *scoparius*, and *caffeine*. The former is also a cardiac stimulant and acts by increasing arterial pressure. I am inclined to believe that much of the unsatisfactory experience in the past with *sparteine* is the result of smallness of dose used. So small a quantity as one-eighth, one-twelfth, and even one-twentieth of a grain, as commonly recommended, are quantities which are totally without effect. My smallest dose is one-fourth of a grain, rapidly increased to one-half until the quantity of two grains a day is reached. With these doses I have had in some instances extraordinary diuresis, while the drug is well borne by the stomach. When it is remembered what a world-wide reputation "broom-tea" has, and what a really efficient diuretic it is, notwithstanding the nauseous character of the infusion and the large doses required, it is but reasonable that *sparteine* in sufficient doses should have a similar effect, if at least it constitutes, as we are taught, the active principle of broom.²

Caffeine acts differently, and is supposed to stimulate directly the renal cells, and is therefore contra-indicated in acute nephritis, but in

¹ The method of directing "drops" so constantly in use causes great uncertainty, which is increased when the drop and minim are interchangeably used, and still more when the "dropper" is employed. It is well known that in most all tinctures a minim equals two drops dropped from a tolerably large-necked bottle. Some experiments with the "dropper," which is usually a glass tube drawn down towards a point, provided with a rubber nipple at the other end, gave me astonishing results. I learned that four and even five such drops were sometimes necessary to make a single minim.

² Within a few days I have heard from a friend to whom I suggested a trial of *sparteine*, in the following words: "I have used *sparteine* in one-fourth-grain doses three times a day with most astonishing results, flow of urine coming up from sixteen to ninety-two ounces in the twenty-four hours."

chronic parenchymatous nephritis, like that of the patient before us, I have found it harmless and efficient, and especially so in cardiac dropsies. My dose is three grains of the citrate from one to three times a day, and under its use I have seen the urine rise from less than a pint to three pints and over in a single night. Sometimes I give only one powder a day, but five grains three times a day may be given, although I seldom find this dose necessary, or at least, if the smaller dose is without effect, it is scarcely worth while to give the larger. Another advantage I find in caffeine is that it sometimes also acts upon the bowels and thus the two effects co-operate.

It is scarcely necessary to say that the highly-stimulating diuretics, if they be diuretics, such as cantharides, copaiba, buchu, etc., are not indicated in nephritis of any kind.

The justly-dreaded complication of uræmia occurs less frequently in connection with chronic parenchymatous nephritis than with the interstitial form. At the same time it may not be out of place to refer to its management here. The measures intended to favor eliminative action by the skin, bowels, and kidneys all aid in averting the dangerous condition. It occurs, however, occasionally, in spite of such measures, and may be ushered in by drowsiness deepening into coma, or by convulsions. The drowsiness and coma call for increased elimination, but the convulsions demand further treatment. It is true also that opium is better borne in parenchymatous inflammation of the kidneys than in interstitial nephritis, and many do not hesitate to control the uræmic convulsions of this disease by hypodermic injections of morphine, but I prefer to avoid all risk and to control them either by chloral or chloroform. A drachm of chloral by enema is frequently sufficient, and if not, there is no condition in which the inhalation of chloroform is more harmless. While this is being done elimination by positive measures is called for. The only additional remedy which need here be alluded to is jaborandi and its active principle pilocarpine. That these substances are the most efficient and certain diaphoretics in the Pharmacopœia is well known. That their use is, however, attended with some danger is also conceded. While a depressing effect on the heart is one of the harmful effects, œdema of the lungs is undoubtedly the greatest danger. But that death in uræmic convulsions is also ushered in by œdema of the lungs where pilocarpine is not administered is also to be remembered, and not every case of death with œdema of the lungs when pilocarpine has been given dare be ascribed to this drug. At the same time, in view of this danger, where perspiration can be promptly induced by the hot-air

bath or vapor bath, it should be preferred. Should it, however, be impossible to secure sweating in this manner, I do not hesitate to give one-fourth of a grain of nitrate of pilocarpine hypodermically and repeat it in fifteen minutes, if the desired effect does not follow. Extreme danger requires corresponding remedies, and some risks must be taken. It should be remembered, too, that much may be done to favor the effect of pilocarpine by covering the patient warmly, and surrounding him by hot applications. The effect of atropia in drying up excessive secretion should also be remembered, and I have seen an œdema of the lungs disappear almost instantly after injecting under the skin one-sixtieth of a grain of atropine, and undue action of the sudorific sparteine may be similarly controlled.

ASTHMA.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA POLYCLINIC.

BY THOMAS J. MAYS, M.D.,

Professor of Diseases of the Chest in the Philadelphia Polyclinic; Physician to the Rush Hospital for Consumption.

CLINICALLY speaking, asthma is a paroxysmal dyspnoea followed by inflammation of the bronchial mucous membrane. If the intervals between the attacks are prolonged sufficiently, all physical evidence of the disease disappears. It is essentially not a disease of the lungs or of the bronchial tubes, but of the nerves which supply these parts. It is a convulsion confined to the pulmonary branches of the pneumogastric nerves, which produces a spasmodic contraction or narrowing of the bronchial tubes, the shortness of breath and the bronchitis being merely the sequences, at least in a great measure, of the disorder. Asthma is, therefore, a neurosis of the pneumogastric nerves and their centres, and belongs to the domain of nervous rather than to that of chest diseases.

In the great majority of cases this disease is inherited. Not only is this true so far as its direct inheritance is concerned, but it may also be transmitted as the modification of some other nervous disease which existed in the parent. Insanity, epilepsy, hysteria, alcoholism, etc., are in this way converted into asthma. Even in the same family of children one may suffer from migraine, one from epilepsy, another from asthma, and so on.

Besides the influences of direct and of indirect inheritance it may also be caused by any offending material which is suspended in the air, like ordinary dust, powdered ipecacuanha, the pollen of grasses and of roses, the odor of certain animals, etc. On being inhaled these substances irritate the sensitive endings of the pneumogastric nerves and provoke spasmodic contraction of the bronchial walls. Irritation of the mucous membrane of the nose, stomach, liver, intestines, uterus, etc., are exciting causes of asthma. Hence you may

have what is sometimes called nasal, gastric, hepatic, intestinal, or uterine asthma,—that is, the principal exciting cause may reside in one of these organs. Poisoning by alcohol, syphilis, lead, and mercury may also produce asthma. It is exceedingly doubtful, however, whether, without the inherited proclivity to the disease, any degree of irritation in any or in all of these organs would have the power of producing an attack of asthma. That which is of the greatest importance for us is the fact that diseases of all these organs which are supplied by the pneumogastric nerves are most liable to excite an attack, and that, as in epilepsy, we have to deal here with a nerve-structure of abnormal instability which is thrown out of balance by the slightest causes.

The chief symptoms of asthma, which are familiar enough, consist in a sudden sense of constriction and oppression of the chest, marked dyspnoea, a short, dry, wheezy cough, a proneness to recur in the early hours of the morning, a compulsory sitting or standing posture of the patient, fear of moving, utter misery, and complete transformation into apparently robust health so soon as the attack is over.

There is one phase of the subject of asthma that has not received the attention that it deserves. I refer to its relationship to pulmonary consumption. Do asthmatics die of this or of some other disease? Although they are supposed to be long-lived, I can find no corroborative evidence of this in the experience of others or in that of myself. The literature on this point is scant, but there is some evidence to show that these cases develop a tendency to phthisis. Out of my own experience I am able to recall four old cases of asthma which moved in this direction. Two of these died of consumption, and two had the physical signs of this disease, but became entirely well under treatment. The elder Williams, in his work on pulmonary consumption (1872), records four cases of asthma which passed into phthisis. Fuller ("Diseases of the Chest," 1862) states that in spite of the belief that asthma and consumption are antagonistic to each other, many asthmatic patients die of consumption. Other authors record similar experiences. It must be borne in mind, of course, that the danger of asthma lapsing into consumption only begins when the attacks of the former follow each other in such close succession that the irritation produced by the preceding paroxysms can no longer be allayed. It is, therefore, more or less, an accumulation of the effects of asthma which leads to its transformation into another disease.

Asthma being a nervous disease, our therapeutic efforts must be addressed to the nervous system (1) towards alleviating the attack, and

(2) towards preventing its recurrence. To achieve the former, atropine, morphine, lobelia, stramonium, chloral, chloroform, the nitrites, pilocarpine, nux vomica, etc., have been used ; while various measures have been employed to accomplish the latter purpose. It must always be remembered that the attack is only the manifestation of a trouble more deeply seated, and that nothing will be of avail so far as a cure is concerned unless it removes the primary cause of the outbreak. Hence the abnormal causal connection which exists between other organs and asthma must be removed ; the baleful influence of specific poisons must be eliminated, and the irritation in the lungs must be assuaged. It must not be overlooked, however, that a general lowering of the nerve tone of the body is very frequently as responsible for disease in other organs of the body as it is for asthma, and that by invigorating the nervous system the asthma as well as its accompanying disorders will disappear.

What agents, then, are of the greatest service in the treatment of this disease? This may be answered by saying that anything which tends to elevate the tone of the nervous system will secure this end. It is astonishing, however, to find asthma disappear under the strangest circumstances. Moving the sufferer only a short distance from the place in which he was attacked will sometimes give instantaneous relief. A most estimable lady who had almost persistent attacks of asthma assured me that she was always free so long as she remained in a moving railroad car. In explanation of the cause of the relief which was afforded by these measures it may be said that in the first it was a removal of the body from the influence of the exciting cause, and in the second it was in all probability the vibrations which were imparted to the body by the moving car, and which had, perhaps, an action similar to the beneficial influence which electricity is known to exert on some of these cases. Indeed, the latter agent was a most valuable adjunct in the treatment of this case.

The agents which I have found of greatest service in treating asthma are strychnine, atropine, antipyrin, phenacetin, quinine, the hypophosphites, and cod-liver oil. Of these, I regard strychnine as the most valuable. That strychnine might do good in asthma was first suggested to me by the excellent results which were obtained by Dr. Echeverria in the treatment of epilepsy with this alkaloid. Asthma is unquestionably a twin-sister to the latter disease, and that which benefits one should also benefit the other. During the last year and a half I have treated a large number of asthmatics, and believe that I have derived more prompt and more positive results from this than from

any other single drug. My general plan is to administer strychnine, usually in connection with atropine, hypodermically, daily or every other day, until the physiological effects of the former drug are beginning to show themselves. This can be brought about by beginning with one-fiftieth of a grain of strychnine and one one-hundred-and-fiftieth of a grain of atropine, gradually increasing the former to one twenty-fifth or one-twentieth of a grain, and the latter to one one-hundredth of a grain. After a thorough impression is made on the disease, these alkaloids are employed at longer intervals, and finally abandoned hypodermically, and administered by the mouth alone and in maximum doses. From the very beginning phenacetin or antipyrin as well as the hypophosphites may be given with great benefit. The last preparation may in connection with strychnine be administered for an almost indefinite time.

The first patient I shall exhibit to you is a female, thirty-seven years old, who had been asthmatic since the age of fourteen up to one year ago. Four years ago her asthmatic attacks became aggravated, her cough worse, expectoration more profuse, with occasional hæmoptysis. She was losing flesh, and was unable to leave her bed for the last two years of her sickness, and during the latter time she suffered with daily paroxysms of chills, fever, and sweats, which were followed by a pustular eruption over the whole body. She was asthmatic almost constantly. Her appetite, as a rule, had been good; she had constipation which alternated with diarrhoea, and her stools were very offensive. Her menses were very irregular and scanty. *No dulness* was present, but there were *mucous and sibilant râles over the whole chest*. She was treated with strychnine, quinine, the hypophosphites, and such agents as would correct the secretions of her alimentary canal, with the result that to-day she is a well woman, and has been so for the last year.

The second case is the one which I exhibited to you nearly a year ago, and which was published in the *Medical and Surgical Reporter*, April 12, 1890. Those of you who were present then will remember his desperate condition, and the ready relief which he experienced from treatment, and I bring him before you for the purpose of showing that his alleviation was not merely temporary, but that it continues up to the present. His history is as follows: His age was fifty-one on December 2, 1889, when he was seen for the first time. He had had asthma for thirty years, and daily attacks during the last ten years. There was constant dyspnoea and cough. He was unable to lie down to sleep for eight years, but spent nearly all his time sitting with his

elbows propped on the arms of his chair. The only relief he ever found was from smoking "Jimson weed." Appetite was good, bowels irregular, and his stools changeable in color. He passed about half a pint of urine in the twenty-four hours. This contained about one-tenth, by bulk, of albumin. An itchy eruption was present over his whole body, and he had much distress in the præcordia, and dropsy of the abdomen, scrotum, and lower extremities. His legs and abdomen were swollen to such an extent that he was unable to wear his former-sized trousers, and the dropsical serum oozed so copiously through the skin below the knees that his drawers and socks became thoroughly saturated, and had to be changed several times a day. There was no dulness over either lung, but marked blowing inspiration existed in the right apex, and mucous and sibilant râles abounded over the whole chest. His mother and brother died of asthma. His weight was one hundred and eight pounds. Strychnine and atropine were given at first once a day, and afterwards every other day. To relieve the dropsical effusion and constipation, concentrated doses of magnesium sulphate were alternated every other evening with five-grain doses of sodium phosphate. He also received seven and a half grains of antipyrin, one grain of powdered digitalis leaves, and one grain of quinine, every four hours. The asthma ceased from the time the treatment began, the albumin soon disappeared, the urine increased in quantity, the bowels became regular, the dropsy diminished materially, and in about two weeks he was able to lie down a whole night and sleep. He finally took cod-liver oil, increased in weight, and soon became practically a well man, and has remained so up to the present time.

The third case is one of specific asthma, the history of which is as follows: Male, aged thirty-three, suffered from dyspnœa and cough for three years, copious mucous expectoration, which was occasionally streaked with blood. His appetite is poor. He is compelled to sit in a chair for whole nights, and has lost fifteen pounds in weight during the last three months of his sickness. There is no history of lung-disease in the family. Physical examination showed *sonorous râles over the whole chest*. He was treated with the strychnine and atropine injections, and small doses of the corrosive chloride of mercury. The injections were continued irregularly for about six weeks, after which the mercury was continued for a while longer. The latter was finally withdrawn, and he was put upon the hypophosphites. The patient has been and is entirely free from the disease, and has resumed his work.

This patient, a male, aged thirty-five, came under my charge six months ago. He had the first attack of asthma when ten years old.

These attacks occurred nightly when I first saw him, and lasted for an hour and a half or two hours. His appetite was good and his bowels regular. He had no history of malaria or rheumatism. He complained of irritability in the nostrils which excited a good deal of sneezing. His mother had bronchitis. Physical examination showed no dulness, but mucous râles distributed sparsely over the whole chest. He received, by the mouth, three grains of phenacetin, one grain of quinine, one-fortieth of a grain of strychnine, one-five-hundredth of a grain of atropine, and a quarter of a grain of red pepper, every four hours, and a nose spray of Dobell's solution. He improved from the time he was placed under treatment, and with the exception of one or two slight paroxysms has since been entirely free from the disease. He is now taking the hypophosphites in place of the phenacetin combination.

The fifth case is that of a female whose age is thirty-six. In this case the stomach was undoubtedly one of the chief exciting causes of the disease. She had asthma for seven years, the attacks of which became very much aggravated during the last four years. Certain kinds of food, like potatoes, or cold drinks, or overloading the stomach, would at once bring on a paroxysm. The liability to these attacks was very much greater during menstruation. She was very nervous, but so far as can be learned, there is no taint of asthma in her family history. She was treated with strychnine and atropine injections every day at first and afterwards every other day. The dose of the former was gradually increased to one-eighteenth of a grain. For the gastric derangement she received six grains each of bismuth subnitrate and of pepsin before each meal. She gradually improved, although I experienced here what I have often seen before,—viz., that it is more difficult to treat asthma successfully in the female than in the male. The attacks ceased, almost entirely, in the course of three months, and, with the exception of a slight tightness during her menstrual periods, she is free from the disease. For the last three months she has been taking the hypophosphites in connection with strychnine, and reports herself as doing very well.

The number of asthma cases which were treated in this manner might be greatly augmented, but I think those already shown suffice to demonstrate that asthma, on the whole, is a very tractable disease. Successful treatment depends on the rational application of remedies, and in order that the agents here recommended may be so applied, and that not too much may be expected from any one of them, I think it is well to bear in mind the following principles: By virtue of their

affinity for the respiratory nerve-supply, and for the reason that they act directly only as physical stimulants to this tissue, strychnine and atropine merely render temporary, though invaluable, assistance in the treatment of this disease. They effectually buoy and elevate the tone of the respiratory nerves, and this condition must be reinforced and maintained by agents which supply material for the permanent building up of these tissues. This end is accomplished by the use of the hypophosphites, cod-liver oil, and food. In most instances the hypophosphites do better work in this respect than cod-liver oil, on account of the repugnance which many patients feel towards the latter agent. Although strychnine is a physical stimulant, it enhances the therapeutic efficacy of the hypophosphites in this disease. That which is true of the action of strychnine and of atropine is also true of quinine, anti-pyrin, and phenacetin, although in a much wider sense, since they act as general stimulants to the nervous system. In all cases of asthma the state of the nose, throat, stomach, intestines, skin, etc., must be carefully investigated, and efforts must be made to correct any fault that may be found in these organs.

Having now said this much of remedies which I believe are capable of yielding the most positive results in asthma, I believe a few thoughts should be devoted to a consideration of the action of those agents, which, though perhaps more frequently employed, are, so far as my experience goes, comparatively useless. First of these come lobelia, stramonium, and tobacco, which are capable of checking the disease by depressing the pulmonary nerve-supply to the verge of narcotism, in doing which they often accomplish more injury than good by disturbing the function of the stomach. Asthmatics who are accustomed to use these agents will tell you that they are only enabled to control the attacks by maintaining a state of constant nausea. The nitrites are also open to objections of the same sort. While these agents do not produce the same profound central narcotism, they exert a similar paralyzing influence on the peripheral nerve-supply of the lungs, and so long as this is kept up the asthma, at least in some cases, is held in abeyance. It must be said, however, that in very many instances they signally fail to bring the expected relief. That which is true of the nitrites is also true of pilocarpine. In some cases this drug exerts a decided amelioration so long as its influence is maintained, and there is reason to believe that this effect is brought about in the same way as that in which the nitrites achieve their results.

Now, in order to form a conception of the manner in which strychnine relieves asthma, it must be borne in mind that under no circum-

stance does spasm exist in virtue of any undue supply of nerve-tone to the bronchial muscles, but rather to a perverted or depressed state of the pulmonary nerve-supply, both central and peripheral, and a consequent loss of respiratory co-ordination. It is reasonable to believe, therefore, that any agent, like stramonium, tobacco, lobelia, nitroglycerin, pilocarpine, morphine, etc., which possesses the power of narcotizing or paralyzing the nerves which incite the bronchial spasm may also relieve the grip of the latter; but it is also clear that the nerves whose integrity is already impaired are enfeebled still further by such a procedure,—which at best has but a temporary influence.

The most rational plan, then, of treating the asthmatic condition is not one which lowers but which elevates the tone and increases the normal resistance of the pulmonary nerves. This therapeutic indication is amply supplied by strychnine, which, on account of its elective affinity for the respiratory centre, stimulates and invigorates without paralyzing these structures, unless it is pushed beyond the point where it begins to manifest its toxicological properties.

SOME OF THE MORE COMMON CAUSES OF INDIGESTION AND THE PRINCIPLES THAT SHOULD GUIDE THE TREATMENT.

CLINICAL LECTURE DELIVERED AT THE MERCY HOSPITAL, CHICAGO.

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GENTLEMEN,—Perhaps the general practitioner of medicine meets with no group of human ailments more frequently than those affecting the digestive organs, and as a general rule none that he treats with less satisfaction to himself and his patients.

I allude more particularly to those functional disturbances connected with imperfect digestion of food, not dependent upon inflammation or structural disease of the coats of the stomach, and usually designated as cases of indigestion or dyspepsia.

They are met with among all classes of people, but much the most frequently in those of sedentary habits or those engaged in in-door or mental occupations. We have before us to-day three cases that are worthy of your careful attention. The first is Mrs. B., a shopkeeping woman, aged twenty-six years, and presenting an anxious and rather dejected expression of countenance; says she is exceedingly nervous and despondent, excited and worried by mere trifling causes, sleeps restlessly, and in the first part of the night often starts from sleep with palpitation, oppression across the chest, and eructation of gases from the stomach. Her appetite is variable, and everything she eats causes a sense of fulness and epigastric distress extending to the left side, followed by gaseous distention and eructations, or sourness and burning in the epigastrium. Her bowels move only once in two or three days unless they are prompted by laxatives. There is a light coat on the back part of the tongue. Her menstrual periods are natural; renal secretion free, but often deposits phosphatic or ammoniacal salts on cooling. Her pulse, respirations, and temperature are usually natural, and physical examination reveals no signs of either cardiac or pul-

monary disease. Her tissues are fairly well nourished. She is in the habit of going into her shop at 7.30 A.M., and attending to her work until 9 or 9.30 P.M., with only brief intervals for meals; and consequently takes very little out-door exercise or rest. She has been following this routine for several years.

The second case is Mrs. B., aged forty years, housekeeper; of fair physical development and nervo-sanguine temperament. She is much confined within doors, occupied with domestic affairs; and accustomed to the free use of tea and coffee. Her countenance is rather pale but not expressive of anxiety, and she has lost some flesh. She complains chiefly of pain in the epigastrium, extending laterally under both breasts, and often up into the chest, particularly to the left; which causes her to think she has "heart-disease." These pains become most troublesome from one to two hours after eating, and are then accompanied by a sense of fulness and copious eructation of gases, oppressed breathing, and sometimes palpitation, especially in the evening and first part of the night. Her pulse, temperature, and respirations are natural, and physical examination reveals no signs of either cardiac or pulmonary disease. She says her appetite is good, bowels regularly moved every morning, and she feels much better when taking moderate exercise in the open air.

Case third is Mr. C., thirty-five years of age, who, as you see, presents a good general physical development, and an outward appearance of being well nourished. He has been occupied chiefly in office-work for the last ten years; has taken but little out-door exercise except walking to and from his office; takes one or two cups of coffee at breakfast, a cup of tea at supper, and sometimes a glass of beer at lunch, and generally smokes a cigar after meals, with one or two extra in the evening.

He says that about five years since he began to notice an unusual, heavy feeling in his stomach an hour or so after his meals, with occasional eructation of gases, but that this would usually disappear before the next meal. About the same time his bowels began to be less regular, with a little coating on the tongue, and dull feelings in the head, which would be relieved by a laxative and a few meals of lighter diet. From these slight beginnings the symptoms have gradually increased, until, during the last year, everything he has eaten has commenced soon after to feel like a pound of lead in his stomach, and in an hour or two to generate gases enough to fill a moderate-sized balloon; while the bowels have not moved once a week unless aided by artificial means. Occasionally, in the latter part of the day, instead of

generating gases, the food becomes acid and causes burning pain, such as is generally called "heart-burn," with restlessness and despondency. Like most patients similarly affected he has taken a variety of laxative mineral waters, and a greater variety of other physics, especially such as are reputed to act on the liver, but with only the most temporary relief. All three of these patients have been under the impression that most of their trouble is caused by a torpid or inactive condition of the liver; and the two first suffer much mental apprehension from fear that they have disease of the heart.

And yet the closest scrutiny fails to detect any evidence of structural disease in either of these organs. The real disease or pathological condition existing in this third case is a semi-paralyzed condition of the gastric tubules and the muscular coat of the intestines. He takes food with a relish, but its presence calls forth neither active secretion of gastric juice nor ordinary peristaltic motion. Hence it feels heavy, and after a little time begins to undergo fermentation, evolving either gases or acid, or both, while the residue, not capable of absorption, accumulates from day to day in the lower bowel.

The causes that have induced this pathological condition are not difficult to trace, if we keep in mind the habits of the patient during the last ten years, as previously stated. These habits embrace three important items,—deficient out-door physical exercise, chiefly mental work in-doors, and the daily use of what would generally be called a moderate amount of tobacco and alcohol. It is well known that any individual when mentally occupied and physically quiet in-doors uses from one to two cubic inches less volume of movable air at each breath than when on his feet with attention diverted. As he takes an average of sixteen or eighteen respirations per minute, it is easy to see that during the eight or ten hours of daily office or in-door work, he has used many cubic feet less of air than he would have done had he spent the same length of time in the open air. Consequently the taking up of oxygen through the air-cells of the lungs and the exhalation of waste carbonic acid have been defective. This deficient oxygenation and decarbonization of the blood during the day leaves a sense of dullness or weariness at evening, which discourages such active out-door exercise as might compensate for the loss during the day. Consequently he is much more inclined to spend the evening in smoking cigars, playing chess, or some other quiet game, and go to bed only to rise in the morning feeling more weary than when he retired and with an indifferent appetite for breakfast. Tobacco, being a strong narcotic when either smoked or chewed, exerts a direct sedative or impairing

influence on the respiratory, cardiac, and vaso-motor nerves, and consequently the third patient before us, by smoking a cigar after each meal, which is just the time when the blood naturally takes up oxygen from the air-cells one-third faster than when the stomach is empty, very materially adds to the defective oxygenation and decarbonization of the blood. So far as his glass of beer is concerned, the three to five per cent. of alcohol it contains is readily absorbed, and so long as it remains in the blood still further lessens the oxygenation of the blood. As both nerve sensibility and force and muscular activity are directly dependent on the due oxygenation and decarbonization of the blood, we readily see why this man during the first five years of his office work gradually suffered impairment of muscular activity and strength, including equal impairment of secretory and muscular or peristaltic action of the stomach and bowels, until now the one no longer secretes normal gastric juice nor the other manifests any disposition to void their contents.

All I have said regarding the effects of in-door occupation and insufficient out-door exercise applies with full force to the first and second patients before us, increased by the undue constriction of the chest by female habits of dress. But both these, instead of the anæsthetic and paralyzing influence of beer and tobacco, indulge daily in the use of tea and coffee, which helps to establish a morbidly sensitive or hyperæsthetic condition of the pneumogastric, cardiac, and vaso-motor nerves. This effect is greatly increased, in the first case especially, by the *mental worry* of her business. Consequently, while they suffer equally with the third case, all the ordinary symptoms of indigestion and moderate constipation, they suffer a great deal more from pain in the epigastrium and chest, palpitations, and disturbed sleep.

If I have thus correctly interpreted the etiological and pathological conditions involved in these cases, what are the indications for treatment? Shall we try to correct the constipation by giving a blue pill at night and a dose of salts or mineral water in the morning? If so, we shall succeed for one day, and one day only. Shall we try to cure the flatulency and eructations by giving antacids and absorbents? By doing so we may palliate the patient's condition some until the next meal-time. Shall we fall into the present popular tide and seek to cure all the ills of these patients by feeding them on peptonoids, liquid beef, beef peptones, liquid bread,—in other words, shall we first digest their food in a chemical laboratory and then try to coax their stomachs to absorb it? If we do, we shall only repeat what they have already repeatedly tried in vain.

The most emphatic question asked by all this class of patients is, What can I eat? They find it impossible to divest the mind of the impression that it is the food that hurts them. Consequently they, and frequently their medical adviser, spend much time and thought in vain search for some kind of food or drink that will "*agree*" with their stomachs, apparently overlooking the fact that the fault is not in the quality of the food, but in deficient oxygenation of their own blood, deficient elimination of the products of tissue-changes from lack of muscular exercise, and absence of gastric juice to act on food of any kind. The only way such patients can be treated with success beyond the most temporary palliation is to require sufficient out-door muscular exercise once or twice each day to start a little perspiration; a fair variety of simple plain food, including a cup of very light or weak tea and coffee, if they so desire, and to avoid absolutely all use of tobacco and every variety of fermented and distilled drinks. The exercises must include the muscles of the chest and arms in order to insure full restoration of the respiratory functions, and a full warm bath one or two evenings each week followed by free, light frictions over the whole surface with soft, dry flannel would render much aid. The permanent maintenance of such habits of life and, for the first few weeks, the use of such a combination of medicines as will prove just laxative enough to secure one natural movement of the bowels daily, efficiently tonic to the vaso-motor nervous system, and gently soothing to the sensitive gastric mucous membrane, will very rarely fail to restore such patients to fairly good health in a few months.

For the third case we have examined I will direct the following :

R Ext. hyoscyami, 8 grammes (= grains xlv);
 Ferri sulph., 8 grammes (= grains xlv);
 Ext. nuc. vom., 1 gramme (= grains xv);
 Pulv. aloes, 1 gramme (= grains xv);
 Pilulæ hydrarg., 1 gramme (= grains xv). M.
 Ft. pilulæ no. 45.

By taking one of these pills before each regular meal-time, in two or three days his bowels will begin to move, at first with difficulty, but thereafter daily, and generally within a week or ten days they will be inclined to move more than once in the twenty-four hours. As soon as that occurs, the pill should be omitted before dinner; and if at the end of another week the bowels are moving easily each day, the pill may be omitted before supper, but the one before breakfast should be continued two or three weeks longer; when, if he is complying faith-

fully with the rules given in regard to exercise and other habits, he may safely omit all medicine.

In the first and second cases the more marked hyperæsthesia of the pneumogastric and cardiac nerves, in addition to the ordinary symptoms of indigestion, renders a different combination of medicines necessary if we would afford the earliest and most effectual relief. They need something more anodyne or soothing to the morbidly sensitive nerves and gastric mucous membrane, and sufficiently antiseptic to retard or prevent the gastric fermentation. For these purposes I have found the following formula more efficient than any other that I have used :

R Acid. carbolic., .50 c.c. ;
Glycerinæ, puræ, 15 c.c. ;
Tinct. gelsemii, 15 c.c. ;
Tinct. opii camph., 60 c.c. ;
Aquæ menth., 60 c.c. M.

Take four centigrammes, or one teaspoonful, in a tablespoonful of water immediately before each regular meal-time and at bed-time. But while this is being taken, something else must be used in addition to prompt a regular evacuation of the bowels. This, in a large majority of cases, can be easily accomplished by adding from five to ten minims of the fluid extract of cascara sagrada to each of the doses of the formula just given. In other cases I have obtained the best results by giving separately from three to six centigrammes of aloin (gr. $\frac{1}{2}$ to gr. 1) in the form of a gelatin-coated pill every night. The first case before us would require a six-centigramme pill, while the second would need a three-centigramme, each night while taking the anodyne and antiseptic formula three or four times per day. In all cases, in proportion as the morbid conditions are removed the medicines should be gradually withdrawn until the patient relies entirely upon active daily exercise, wholesome food, and entire abstinence from fermented and distilled drinks and tobacco.

I have found no cases that were not satisfactorily relieved when treated on the principles I have indicated ; and the relief was permanent whenever they permanently avoided the causes that had originally produced the morbid conditions. But if the patient returns to his former injudicious habits as soon as he is able to omit the use of his medicine, he will soon realize the consequences of his folly in the return of his indigestion and mental despondency.

LEAD-COLIC WITH MARKED ANÆMIA; CHRONIC LEAD-POISONING WITH ARTHRALGIC SYMP- TOMS; NERVOUS FORMS OF LEAD- POISONING.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA HOSPITAL.

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GENTLEMEN,—I desire to-day to bring to your notice a few interesting examples of chronic lead-poisoning, each case illustrating a different form of the complaint.

CASE I.—The first patient, Thomas F., aged forty-nine, laborer, English, was admitted to the male wards of the Philadelphia Hospital on October 28, 1890. He had been working in Wetherill's Paint Manufactory for nine weeks. For one month he worked around the yard filling the kilns, during which period he was not much exposed to the lead; later he filled barrels, packing them tightly so as to get the required amount within the barrel. This required pounding, causing much dust consisting of powdered lead.

After working there about six weeks, his fellow-workmen told him he was becoming of a peculiar color, and at about the same time he noticed that his appetite was failing, that his bowels were becoming constipated, and that his throat was dry and his mouth foul. At this time there was no pain, but at the end of two months he had severe colic, located in the epigastrium and extending down to the thighs. A cramp-like pain was constant; the severe colicky pain occurring in paroxysms at irregular intervals. He then took a week's rest, during which time he took a dose of Epsom salts daily, and in consequence of the purgative and rest his condition was greatly improved. He then went back to work, but after several days was obliged to stop. He now began to vomit, though he had very little nausea, had vertigo, and the pains became excruciating.

For some nights previous to his admission to the hospital he had lost much sleep; he had some pain on micturition, a symptom that troubled him occasionally for several weeks, though the pain gradually became less severe. There was a well-marked bluish-black line at the junction of the gums with the teeth.

At the end of one week after admission, his colic ceased, and simultaneously most of the symptoms pointing to nutritional disturbances subsided. In the course of a few days, however, he had a return of the colic, lasting several days.

He is still somewhat troubled with constipation, but has had no colic for four weeks; he still has the characteristic line on gums, though it is only noticeable around the partially-decayed teeth; and he has some evidences of saturnine cachexia. It should be noted that on admission he was suffering from well-pronounced anæmia. You will also recall that prior to admission his complexion was peculiar.

As a rule in these cases the cachexia is first evidenced by an earthen hue of the skin and sometimes, as in this case, there is a slightly yellowish tinge. This is succeeded by pallor of the countenance, lips, and tongue,—in short, all the characteristic evidences of anæmia.

Lead has been found in the marrow of the long bones, and this is significant in view of the fact that the pathological changes of the blood noted in anæmia, due to lead-poisoning, are almost identical with those observed in cases of pernicious anæmia. Not all of the cachectic conditions, however, are ascribable to this cause, for in every case we have associated with it impairment of digestion, which must have an important influence in the same direction.

We had this patient's urine examined on several different occasions, but no lead was found in it. I would here lay stress upon the fact that the finding of lead in the urine is not *prima facie* evidence of chronic lead-poisoning. Drs. Como and Worcester, of Harvard University, have examined the urine of one hundred and fifty persons living in and near Boston, and in twenty-five per cent. of these specimens traces of lead were found; yet none of these persons ever had a single symptom of chronic lead-poisoning. Where, however, we have well-recognized symptoms and conditions due to lead-poisoning, the finding of lead in the urine becomes valuable confirmatory testimony. Upon the other hand, you will be unable to find lead in the urine of persons giving every evidence of this affection, though, as a rule, if the test be sufficiently delicate and trial be made from time to time, lead will be detected.

The prognosis in the present case is favorable, and this is true of all cases of chronic lead-poisoning that have not progressed beyond the

point reached in this instance,—namely, the stage of lead colic,—provided, of course, the patient discontinue exposure to the action of the lead.

The morbid anatomy in cases of simple lead colic is not perfectly understood. It is definitely known, however, that we have first parenchymatous changes in the mucous membrane, that the blood-vessels are next affected to some extent, and that, lastly, sclerotic degeneration of the submucous glands occurs.

The treatment of this man's condition should be directed to overcoming the cachexia and the further removal of any lead that may still remain in the economy. We shall continue to give him the iodide of potassium in ten-grain doses, three times a day, with a view of separating the lead from the tissues, and a daily dose of the sulphate of magnesium for the purpose of eliminating the lead from the system.

I shall prescribe, in addition, the following formula :

R Tr. ferri chloridi, ℥x ;
 Liq. arsenici chloridi, ℥ii ;
 Syr. zingiber., q.s. ad ℥i. M.

Sig.—At one dose, after each meal, well diluted.

The iodide of potassium and the sulphate of magnesium should be administered when the stomach is comparatively empty.

CASE II.—This patient's history is as follows: R. B., aged sixty-two, was a laborer as a young man, and later a *papier-maché* maker; his family history is negative, with the exception of the fact that his father died of chronic lead-poisoning.

About twenty years ago, when in Louisiana, he had swamp fever, of which he was ill for six months. He had pneumonia many years ago, and rheumatism four years ago. He never has been a drinker of alcoholic beverages, used to smoke tobacco in moderation, and denies emphatically all venereal history.

He worked at a manufactory until the age of fifty-four, when, for the first time, he was seized with symptoms of lead-poisoning. The first attack of colic was very severe, lasting, however, only a few days.

In connection with that he had cramp-like pains in the small toes, and a little later in all of the toes. He had also pains in the muscles of the arms and in those back of the left shoulder.

After being cured of this attack he went back to his old occupation, but was again similarly affected, and in addition had wrist-drop, this symptom lasting for about ten days or two weeks. This was in the year 1859 and a portion of 1860.

He did not go back to his old occupation, but in the course of a little while took to painting in oils.

In 1866 he had a third attack, with severe colic, intense pain in the toes, muscles, arms, and shoulders, and in addition wrist-drop, as during the former attack. When he was cured of this attack he did not go back to painting in oils.

He had been painting pictures for a short time in the autumn of 1890, when, on about October 6, he was suddenly seized with weakness in his arms, colic, and pains in the toes. He was brought into the hospital in this condition.

Since admission all of his pains have very much improved. He still has loss of power in the extensor muscles of the hand, though this condition is only occasionally present. He has a faintly-marked blue line along the gums, which are swollen, very tender, and at a few points distinctly ulcerated. He cannot chew meat. He has obstinate constipation and continual pain in the bowels, greatly relieved by means of salts.

The pains in his toes continue in paroxysms, which occur at irregular intervals. He describes this pain as a pinching or tearing sensation.

You will observe that the toes are somewhat tender to the touch, and the ball of the left great toe, which is the seat of considerable nodular swelling, is decidedly tender. These are evidences of a gouty affection.

In this connection we have to consider the relationship existing between chronic lead-poisoning and gout. Certain English authors, more particularly Garrod, Todd, and Bence Jones, contend that gout is frequently associated with cases of lead-poisoning, while Gowers holds that gout is produced by saturnine toxæmia. Lancéreaux has examined into the morbid anatomy of the kidneys, arteries, and joints in cases of lead-poisoning, and has found the pathological changes to be identical with those found in these organs in ordinary gout. He claims that in both affections we have the evidences of interstitial nephritis. In view of the fact that in all cases of chronic lead-poisoning there is diminished elimination of uric acid, there can be little doubt that lead-poisoning constitutes an important causative factor in the production of gout.

The differential diagnosis of the arthralgic conditions met with in chronic lead-poisoning is important, though confessedly difficult in some cases. The arthralgia that belongs, strictly speaking, to cases of lead-poisoning is not attended with swelling of the joints, nor tenderness on pressure; in fact, firm pressure frequently relieves the pain;

hence there should be no difficulty in distinguishing it from rheumatism. The pain located in the muscles, in lead toxæmia, does not follow the course of the nerve-trunks, and the tender pressure-points of neuralgia are wanting. Pressure by means of the hand relieves rather than aggravates this pain, just as in the case of the joint-affection. These arthralgic conditions partake of the nature of lead colic in that they appear and disappear rather suddenly, recurring at irregular intervals of time. They are more frequently met with than lead palsies, though decidedly less frequently than attacks of colic.

The prognosis in these cases is rendered favorable by an only moderate degree of cachexia, as well as by the fact that the patient has not had previous attacks,—and by the absence of motor-palsies and interstitial nephritis.

In most respects the treatment of this case is identical with that in the other case, since the arthralgic pains frequently yield readily to the so-called specific treatment. When the pains are very intense they sometimes call for a hypodermic injection of morphia.

CASE III.—Now, the third case that I desire to show you is one in which we have the effect of the lead produced entirely on the nervous system.

I show you this man through the courtesy of my colleague Dr. Mills. His history is as follows: A. M., aged sixty-two, occupation that of a carriage-painter. He tells us that he worked at carriage-painting for forty-three years. Five years ago a brush which he was holding in his left hand suddenly dropped to the floor and he found his hand paralyzed. His right hand had its usual power for two weeks longer, when it also suddenly became similarly affected. This loss of power soon extended to the arms, then to the legs, and finally to the muscles of the trunk.

One month after the date of onset he was admitted to the Nervous Wards of the Philadelphia Hospital.

Soon after admission he had to take to his bed, where he remained for six weeks. After getting out of bed he was obliged to use the chair five weeks longer, and altogether remained in the hospital for one year. He was then discharged, apparently cured, and returned to his trade. After working five months he was again seized with wrist-drop, and came into the hospital, where he remained for three months, when he was pronounced cured.

We find that within the last five years he has had four different attacks of chronic lead-poisoning.

Five weeks previous to the date of last admission (November 7) he

began to have a feeling of great weakness in the lower extremities as well as of the wrists; this alarmed him, because of the fact that five years since he became paralyzed in the same way. He was given the ordinary treatment already indicated, and improved.

You see that he is very thin, pale, and cachectic-looking. This emaciation extends all over the body, and you notice that he holds himself in a very much stooped position. When I ask him to bring his arm and hand into the horizontal position, you notice that he has the power to extend his arm, his thumb, and his forefinger, the middle, ring, and little finger falling at right angles to the hand. When I ask him to extend the left arm and hand, you observe that he does so with the exception of the forefinger, which droops,—this being the only finger of the right hand, you will have noticed, that he was able to extend. The right hand and arm are affected to a greater extent than the left. He is better able to flex the arms than he is to extend them.

Now there are several features of unusual interest in the history of this man's case.

Notice the photograph of this patient when admitted. (See plate.)

It is quite rare in cases of lead-poisoning to have motor-paralysis appear suddenly without any of those characteristic conditions already described—namely, lead colic, arthralgia, and nutritional disturbance—as precursors.

This patient has never had any affection of the sensory nerves. While disturbances of sensation are rare, you should remember that anaesthesia does occur. It may be of cerebral type, or it may be due to a peculiar form of neuritis,—a neuritis in which the medullary sheath only is affected, the axis-cylinder escaping, hence a periaxial neuritis, which is said to be segmental.

We also had, in this man's case, a rapid involvement of the arms, legs, and the muscles of the trunk. The man at that time walked in a much stooped position, with a very tottering gait, showing that the long muscles of the back were affected,—a rare condition. Now, we want to be particularly careful in diagnosing this form of paralysis. Wrist-drop may be due to pressure upon the musculo-spiral nerve, and it is the muscles supplied by this nerve that are mainly affected in the wrist-drop of lead toxæmia. The points of difference are as follows: In wrist-drop due to the action of lead the condition is very generally, after a short time, bilateral; in pressure paralysis, very generally unilateral. In lead palsy not all of the muscles supplied by the branches of the musculo-spiral are simultaneously

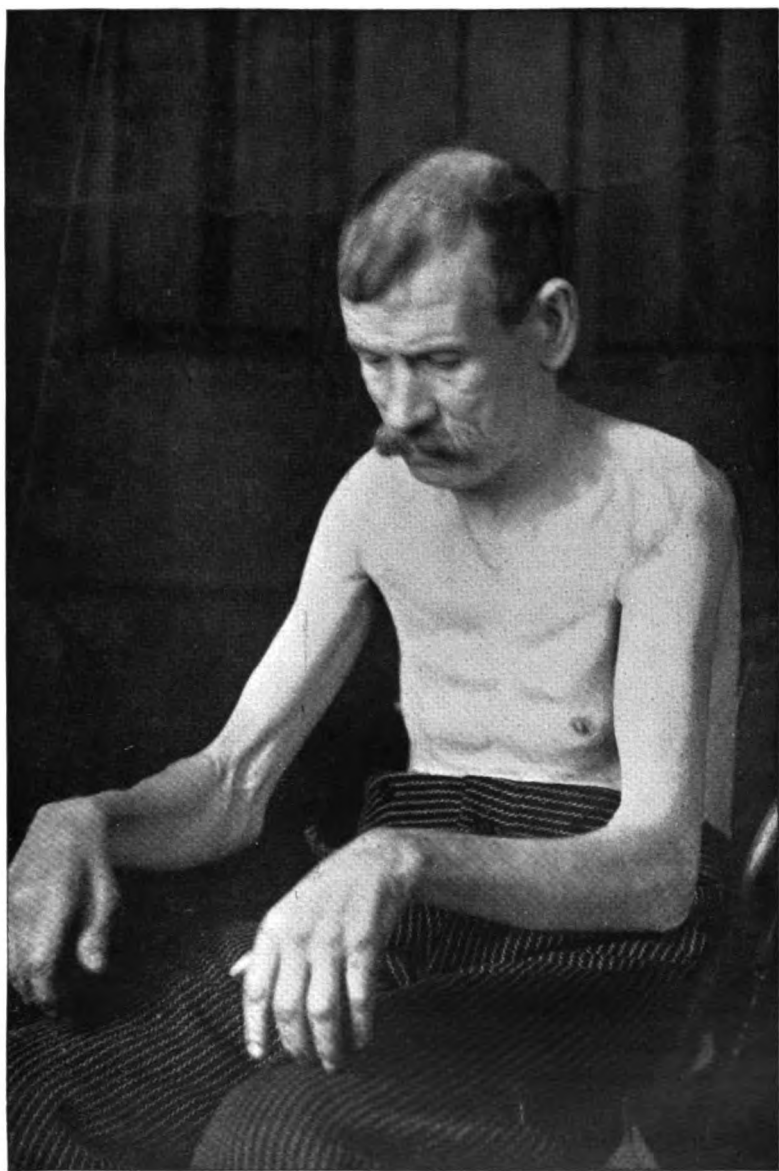


FIG. 1.—Chronic Lead-Poisoning. Showing paralysis of extensors.

involved, as you observe in this case, and the muscles affected give the reaction of degeneration. Much importance is also to be attached to the history of the case, and you should always look for the lead line on the gums. Pressure paralysis very rarely is bilateral, as in the case reported by Professor H. C. Wood, and in these cases the supinator longus and the extensor of the thumb do not escape, as in lead palsy, there is no reaction of degeneration, and there is absence of all of the characteristic signs and symptoms of chronic lead-poisoning, as before pointed out. There is, in addition, usually a history of pressure having been made for a considerable length of time upon the main trunks of the musculo-spiral nerve owing to a peculiar position of the body.

Lead palsy must be distinguished from anterior poliomyelitis. In the latter condition we have the same rapid wasting of the muscles and the reaction of degeneration, but here the similarity ceases. In the latter disease there is at the onset high fever, with such cerebral manifestations as delirium, convulsions, and frequently coma. There is very little fever in cases of chronic lead-poisoning, which fever must be ascribed to the restlessness of the patient. In lead paralysis there are usually associated other unmistakable evidences of lead-poisoning, already enumerated. In doubtful cases the urine should be examined and the gums inspected. The distinction is important, since the majority of cases of lead-poisoning yield to treatment.

Paralysis due to arsenical poisoning sometimes simulates that due to lead. Arsenical palsy usually begins in the lower extremities, and is attended with great pain, which latter symptom you will remember is absent in lead palsy. There is usually a history of the characteristic symptoms of arsenical poisoning immediately preceding the development of this form of paralysis.

The prognosis in these cases depends very much upon the degree of cachexia present, to some extent upon the time which has elapsed since the onset of the trouble, and the number of muscles implicated. It is also favorably modified by discontinuance of exposure of the patient to the influence of lead.

You will institute the specific treatment already indicated, carrying it forward systematically and continuously so long as it benefits the patient in the least degree. It is to be remembered, however, that after cessation of the action of lead, the condition is apt to progress entirely independently. When you are positive that this point has been reached, you should turn your attention to the removal of the cachectic condition and the restoration of the wasted muscles. For the

saturnine cachexia you should employ the recipe previously given you, while for the muscular condition strychnine and electricity should be employed.

Strychnine has extraordinary influence over this form of paralysis, but it must be given in full doses, beginning with one-thirty-sixth of a grain and increasing the dose until one-twelfth of a grain is given, thrice daily. Do not, however, give large doses of this drug unless the patient be under constant observation.

The galvanic current is to be applied to the muscles until they show decided signs of improvement, when it is well to substitute in the majority of cases the slowly interrupted faradic current.

CASE IV.—It is through the kindness of Dr. Dercum, under whose charge he is at present, that I am enabled to show you this patient. B. C., aged sixty-four, was a car-painter for twelve years, during which time there was not a single symptom of chronic lead-poisoning. He changed his occupation, and went to work in Wetherill's White Lead Manufactory, at first being occupied about the yard, later being employed in filling barrels. You may remember that it is necessary to pound the lead in doing this, a process that gives rise to much dust. He came into this institution suffering from wrist-drop and disturbance of nutrition. He was treated for wrist-drop in the Medical Wards of the Philadelphia Hospital, and was twice bled, I think, at an interval of about one week. Marked improvement followed each bleeding. He now went into the car-shops once more and did not even undertake to paint, but simply sand-papared down the sides of the cars after the first coat of paint. He was probably exposed to lead, even though he got no lead upon his hands. He at all events had a second attack, which began with great weakness, especially of the lower extremities.

He came into the Nervous Wards of the Philadelphia Hospital, soon took to his bed, and became unable to walk. He remained in bed for one week, his case being diagnosticated as one of myelitis due to lead. After he had recovered some degree of power, his right leg seemed much weaker than the left, and so we find it to-day. The limbs are very thin, but the muscles not particularly wasted. He has, since in the institution, been simply resting and given the so-called specific treatment, before indicated, under which his paralysis has been rapidly disappearing. He should now be given strychnine in full physiological doses, and in addition electricity should be employed. He should not be allowed to go back to his former occupation, for, while it is well known that one attack of chronic lead-poisoning predisposes to a subsequent attack, it should always be recollected that this is true

of paralytic forms of the disease to a much greater extent than any other.

Gentlemen, I have said nothing thus far on the subject of the prophylactic treatment of this affection. The points to be borne in mind, in this connection, are that good ventilation and scrupulous cleanliness stand paramount. The practice of wearing a sponge or towel over the mouth is apt to lead to a false sense of security, which engenders a disposition to neglect other more important modes of prevention. Since the stomach is the chief avenue of entrance to the system, care should be exercised to prevent the food or drink taken from becoming contaminated with the lead. All meals should be taken away from the place of work, and on going to the table, cleanliness of hands and face as well as change of clothing should be rigorously attended to.

Surgery.

PERMANENT CURE OF HERNIA IN THE GROIN.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY OF MARYLAND HOSPITAL.

BY LOUIS McLANE TIFFANY, M.D.,

Professor of Surgery in the University of Maryland.

GENTLEMEN,—I am so fortunate as to be able to bring to your notice this morning four cases of hernia, all representing different phases of the disease, and all having been subjected to operation for a permanent cure of the trouble. Three of these cases have been operated upon within the last few weeks, and are now presented to you as apparently cured. The fourth case entered the hospital but three days ago, and, of course, while his condition is favorable, the outcome of the operation it is not yet possible to foresee.

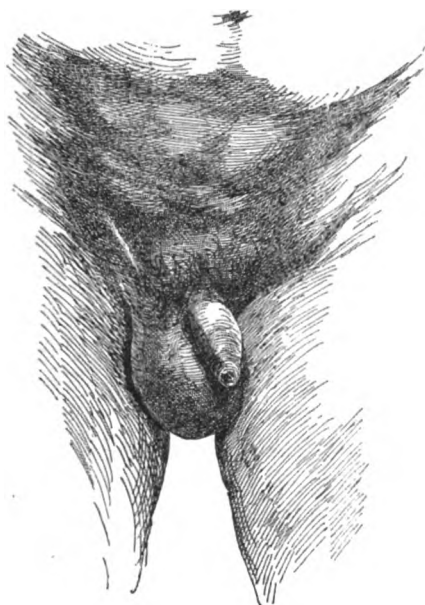
In Case I. the hospital record shows the following :

John D——, aged fifty-seven, entered the hospital September 22, 1890. His occupation is that of a collector. Three years ago while carrying a stove up-stairs he noticed a pain in his left groin, to which he paid no attention, but shortly afterwards, and within a few minutes before reaching the top of the stairs, he felt something give way. A few minutes thereafter a lump appeared in about the region of the left internal abdominal ring. Since that time this lump has been gradually increasing. He suffered but little from it, however, until three months ago, when intestinal cramps occurred frequently, his night's rest was interfered with, and he was obliged to discontinue his occupation as a collector. The family history is negative, and up to the time of entering the hospital the patient had been healthy. Examination showed a lump in the left inguinal region (not protruding through the external ring, however), about half the size of the fist, containing bowel, which was easily reducible.

In view of the absolute inability of the patient to pursue his vocation, an operation for the cure of the trouble was decided upon. This was performed on October 2. After being properly prepared, a long incision was made over the tumor in the direction of the inguinal canal,

the sac exposed and opened, the bowel reduced, the sac drawn down and tied above the internal ring, the sac below the ligature cut away, and the wound closed by deep and superficial sutures, a drainage-tube being allowed to remain at the lower angle of the wound. The dressing consisted of sterilized bandage, gauze, cotton, etc.

The patient on October 5 was somewhat unruly and displaced his dressings, which remained off for several hours. They were, however, replaced, but inflammation supervened. The suppuration which followed necessitated a free opening by incision at the lower portion of the wound on the twelfth day after operation. All, however, went well. The patient is at present without his hernia, a firm, dense cicatrix indicating its former location. (See accompanying cut.)



CASE I.—Showing condition three months after operation. No protrusion or swelling exists under the scar.

Case II. is a female, also before you, whose history, taken from the hospital record, is as follows :

Mary E— (German), aged fifty-six, occupation housewife, has a right femoral hernia. Family history negative. She has been a widow during the past twenty-three years, and has had five children, the youngest being twenty-five years of age.

Several years ago (date not very accurately given) she noticed a

tumor in her right groin, which caused no trouble, and which disappeared in the evening when she lay down, to reappear when she resumed her work during the day. She has never worn a truss. Three weeks ago the lump became very tense, but was, after some trouble, reduced by her physician. On this occasion she was placed in bed with head low and buttocks raised, in which position she remained for a number of hours.

She entered the hospital on September 5, 1890. Two or three times during the next few days she had pain and swelling in the right groin, and the lump was reduced with difficulty. On September 25 the hernia again came down and remained strangulated for a number of hours, causing great pain. On September 28 the hernia again became strangulated at about two P.M., and remained irreducible until five P.M.

On the 29th the operation for cure of the hernia was performed. The patient, after thorough cleansing and etherization, was brought into the amphitheatre, the hernia reduced, and an incision made in the long diameter of the swelling, which was from above downward and inward, the centre of the incision falling over the right femoral ring, through which the hernia protruded. The length of the incision was about six inches. The hernia being uncovered, the sac was opened, and the bowel with omentum found to constitute the tumor. Reduction was easy. The sac was freed from its connections at the femoral ring, drawn down, tied, and cut off high up. The finger of the assistant was passed into the sac so as to prevent the bowel or omentum from being included in the ligature. The usual sterilized dressing was adjusted.

The subsequent history of the case calls for no comment. The patient is present to-day, with a firm, painless scar replacing the femoral hernia, which does not make its appearance on coughing, effort, etc.

CASE III.—This case differs from the other two inasmuch as the patient is a child, and the operation was done not from any pain which the child suffered, but from absolute inability of the mother to obtain a truss which would retain the rupture within the abdomen. During the past year the hernia has steadily enlarged, and promised to render the little patient's life extremely useless. The hospital record is as follows:

Edward J—, aged six years and six months, entered the hospital on October 23, and was operated upon on the following day for left oblique inguinal hernia. Before operation the bowel was made out as adherent to the testicle. In consequence of this peculiarity the truss could never be applied with any advantage, as, of course, you will

understand that if the truss was worn, the testicle had to be passed into the abdomen, or else the bowel allowed to support the weight of the truss. It was manifestly clear, therefore, that something had to be done.

The patient having been prepared as usual, the operation was performed on October 23. A long incision was made over the long diameter of the tumor,—namely, in the direction of the left inguinal canal,—and the sac freely opened. It was, of course, of the congenital variety, no tunica vaginalis being present, and the peritoneum continuous from the belly into the scrotum. The intestine was adherent to the back of the sac and also to the testicle. The gut was freed by dissection from its adhesions, and in so doing the muscular coat of the bowel was exposed over an area of one inch by two inches. The oozing from this raw surface of the intestine was arrested by pressure with sterilized gauze. The fragments of the sac were united above the testicle so as to form a tolerably complete tunica vaginalis, but it was found impossible to tie the peritoneum at the internal ring. Deep stitches were then taken at the internal ring, drawing together it and so much of the peritoneum as existed after the reduction of the bowel. The canal was then sutured and an aseptic dressing applied, a small drainage-tube being placed in the lower opening of the wound.

The subsequent history of the case requires no comment. All went well, and the boy is now about to leave the hospital, with no hernia, and a firm cicatrix in his left inguinal region.

Hernia, as you know, is one of the most frequent deformities to which the human being is subjected. During the late war one in every nineteen or twenty recruits for the Union army was rejected on account of hernia. The number who die from strangulated hernia it is difficult to know. Mastin, in a late paper before the Surgical Association, says that one out of every six hundred deaths results from strangulated hernia.

With an affection of such frequency and of such mortality, you will readily understand how, from the earliest history of medicine, the ingenuity of surgeons has been employed in inventing methods for the cure of rupture. Extirpation of the testicle, the actual cautery applied to the sac, and other methods more or less crude, were in vogue from the earliest times until within recent years. Then supervened a period when attempts were made by ligature or invagination of the sac after reduction to cause a closure of the canal through which the rupture descended. The methods of Wood, Wurtzer, and many others too numerous to mention, have all been tried, and gradually been discarded. For a certain period following every method success has

been apparently obtained ; but a recurrence of the hernia has been very, very frequent. Up to within a very recent date bloody operations for the relief of hernia have been followed by great mortality, a mortality due very largely to complications arising from inflammatory processes.

Within the last few years, thanks to the application of the teachings of Lister, the operations for the cure of rupture have become much less fatal and more successful,—less fatal at the time of performance, and much more successful so far as the disappearance of the trouble is concerned. The open method, which is, I believe, always made use of now, is the direct result of antiseptic surgery. The methods employed are many, and they all have for their object the obliteration of the canal through which the bowel makes its way out of the belly.

The method of Macewen, who rolls up the sac and uses it as a plug within the internal ring, and of Barker, who uses the cut-off sac in somewhat the same way ; the method of Ball, who twists the sac, ties it, and cuts it off ; the method of Banks, who ties off high up and sutures the pillars with silver wire,—all have for their object the same main indications. The method of McBurney is spoken of as an open one, because he leaves his wound to fill with cicatricial tissue. Then there are others, to which it is hardly necessary to refer.

All the modifications of the operation seem to be without much risk, and as yet it is impossible to furnish data showing which one will give results more favorable than another. They all give apparently good results for a month or two, but a hernia is not to be considered cured because it disappears for sixty or ninety days. The mistake in the past has been to think that, because the patient goes out with no lump in the groin, therefore the hernia is cured. It is not so. An observation in regard to the result of an operation for the radical cure of hernia is extremely imperfect and useless unless such observation be made not less than one year after the patient has ceased being under treatment. This is the reason why operations have multiplied so greatly of late years and why statistics are still wanting. It is difficult to keep the run of patients who have been subjected to an operation, and who have then returned to active business life. This is probably impossible unless surgeons aid each other by reporting to the operator the result of his case after a certain number of months, but it goes without saying that if the result is not fortunate the surgeon into whose hands it falls does not like to make an unfavorable report to the first operator.

There does not appear to be any good reason yet to choose between

the different operations which I have mentioned, or indeed between the many others with which the journals of the day are filled. It is probable that certain general measures are expedient,—namely, the reduction of the bowel, even if adherent, excision of omentum so adherent as to prevent reduction, the tying off of the sac high up within the internal ring, and the removal of the sac distal to the ligature. It is a matter of doubt whether it is worth while to close the pillars of the ring, or the sides of the canal through which the bowel has protruded, by suture. It is probable that granulation will close the canal sufficiently well, but this is to be proved.

I think the matter of the greatest importance is the tying off of the sac high up. Other things may be treated and are treated by different operators according as their fancy may dictate, but the high tying of the sac I think is essential. Pretty nearly all the operations recorded will give good results for a time.

It is scarcely necessary to urge upon you the necessity of performing such operations under the strictest rules of antiseptic surgery. The cases presented to you have been prepared as follows: The region to be operated upon, as well as the surrounding skin, has been washed with soap and hot water, shaved, scrubbed with a nail-brush, and then wiped dry. The surface is then washed with turpentine, and the turpentine washed off with more soap and water in order that the skin shall not be irritated. After removal of the soap by more water, the surface is covered with towels wrung out in corrosive-sublimate solution, one to one thousand, and bandaged. This cleansing is done several hours before the operation. If possible, the cleansing should be done the night before.

You will note that practically the same operation has been done in the three cases, one for inguinal hernia not protruding through the external ring, one for femoral hernia, and one for congenital hernia in a child. I know of no reason why the same general method should be more successful in one case than in another. The modification which was necessary in the child's case resulted from the absence of peritoneum at the internal ring, but I see no reason why a good result should not be obtained by suture as well as by ligature, provided the suture be sufficiently high. Such has been my experience in two other cases of hernia where I have operated for strangulation. In both of them I sutured the peritoneum at the internal ring and obtained a permanent cure. The question of operating during childhood is perhaps one open to discussion. I do not hesitate, however, to offer to a child in whom a truss is useless the same operation that I would

offer to an adult, and I would expect just as favorable a result. I do think, however, that it is not proper at once to operate upon a child, as we know that in young children the closure of the hernial ring not unfrequently takes place while a truss is being worn, and to subject a child to a useless operation is, of course, inexpedient. The reduction of the bowel partially denuded of peritoneal coat was a necessity, and appears to have given rise to no inconvenience. One would think that the bowel would form adhesions, but the outcome seems to have been good. The child's mother promises to let me hear from her within the next few months in order that I may not lose sight of the case.

Under modern methods the mortality following the radical operation for the cure of hernia is extremely small, although statistics of large numbers of cases are still wanting; but I think it an operation attended with as little mortality as is any minor operation. I use the word minor intentionally. It goes without saying that when called upon to operate for strangulated hernia the reduction of the bowel, unless greatly diseased, should be always followed by an attempt at permanent cure. There is no reason why a patient whose sac is already open for the replacement of the bowel within the belly should not at the time be afforded every opportunity for permanent recovery, and an operation for hernia is incomplete and bungling unless at the same time an attempt is made to permanently cure the rupture. The only condition under which such an attempt should not be made is where the surgeon may be in doubt as to the power of the bowel wall to recuperate from the pinch at the line of constriction.

The fourth case which I have to mention is one operated upon four days ago, whose history is so especially instructive as to call for a passing notice. The patient is a male, aged sixty, who had been subject to a right inguinal hernia for eight years. He had worn a truss, and had suffered but little inconvenience. The bowel came down one week ago, and was reduced. Two days later it again came down, and was again reduced. The second day thereafter it came down, and remained so all night. Efforts at reduction were made, but the attending physician was uncertain as to whether he had been successful. He thought he had. There still remained a lump in the groin, so the patient was placed on the cars and brought to the University Hospital. Dr. Kemp, his physician, accompanied him. I found him with a lump in the right groin, extremely tender and fluctuating, and was unable to make an accurate diagnosis. In consequence of the handling to which he had been subjected during the last

few days, I abstained from making a prolonged examination, and after shaving and cleansing the skin at once operated. I found that the bowel had been reduced, but that inflammation and gangrene of the sac had occurred, and that the canal into the abdomen was closed by inflammation ; so I at once excised the sac freely, tying the neck. The patient is recovering as after any other aseptic operation. This is, of course, not strictly an operation for hernia, but it is one upon an inflammatory and gangrenous hernial sac, and may, therefore, be presented to you with advantage in connection with the other three cases. Of course, though the bowel had been reduced, the gangrenous sac would have caused his death as surely as if the bowel had remained protruding.

GRADUAL DILATATION VERSUS INTERNAL URETHROTOMY IN THE TREATMENT OF STRICTURE OF THE URETHRA.

CLINICAL LECTURE DELIVERED AT THE POLYCLINIC HOSPITAL.

BY J. HENRY C. SIMES, M.D.,

Professor of Genito-Urinary and Venereal Diseases in the Philadelphia Polyclinic;
Surgeon to the Episcopal Hospital, Philadelphia.

GENTLEMEN,—There have been for the past few years many papers in the journals which have considered the treatment of stricture of the urethra, and it may have been noticed that there has been a gradually-increasing tendency of the writers to favor the cutting operation, in preference to that of gradual dilatation. It therefore becomes a very important question to decide, is this change of treatment for the better? It is to be remembered that the method of treatment by cutting is not a new operation,—in fact, it is quite an old surgical procedure; yet, while the operation itself is old, the method of performing it has been so much improved, both in the matter of instruments and technic, that many of the objections have been removed, and it is scarcely just to make any comparison between the present method and that formerly adopted. It is, however, not a question of operations that we have to settle, but one of results; that is to say, Do we obtain from the cutting operation any better ultimate result than we do from the method of gradual dilatation?

It seems to me that one way to answer this question is by a study of the nature of the lesion itself,—that is, the changes which have taken place in the formation of the stricture, and also the changes which are to take place in the method of treatment adopted. First, then, the morbid process which occurs in the formation of a stricture of the urethra is that of inflammation, which has resulted in ulceration and loss of substance; then nature's method of repair in the formation of new tissue, to make good the loss. This substituting of a new tissue for the natural tissue of the part is the best that nature

can do, but it does not fulfil the purpose as well as the tissue which formerly existed at the seat of lesion. In a word, it is cicatricial tissue, the inherent tendency of which is to contract. Again, the pathological process may not have gone on to ulceration and loss of substance, but may have been only a deposit of inflammatory products in the tissues, with formation of new tissue, which is of the same nature as that which has made up the loss of substance where there has been ulceration, and, therefore, the same contraction will take place. Briefly, then, inflammation, new tissue, and contraction are the changes in the morbid process of the formation of a stricture of the urethra.

Having ascertained what are the pathological changes, we are now to learn what are the changes which take place according to the method of treatment. First, the cutting operation: by this method we occasion a wound, and, if a wound, we must have the process of healing taking place in order to have a cure, and what occurs during the healing process? The changes which occur in tissues undergoing this process are familiar to you all: we observe inflammation, new formation of tissue, and, as a result, a cicatrix,—the very same changes that we have seen take place in the formation of the stricture itself. Indeed, is not this method one of true "*similia similibus curantur*"?

In regard to the changes which take place in the treatment by dilatation, there is a want of knowledge as to the exact nature of the process. That it is a mere stretching or forcible dilatation of the part which relieves the lesion, I do not think is the true explanation; something more must occur, and to me it is more reasonable to consider that there has been, in addition to the stretching, an absorption of those plastic matters which constitute a part of the stricture. If we admit that dilatation ever results in a permanent cure, we must also admit that there has been more than a mere stretching of the part. A radical cure, in so far as symptoms are concerned, may, I believe, follow the treatment of stricture of the urethra by gradual dilatation; and, I think, the experience of surgeons who have treated a considerable number of cases by this method must have taught them that such a result occasionally takes place. It therefore seems to me, from a study of the treatment, on pathological grounds alone, that the method by dilatation is the one most rational.

We may now turn to the clinical side, and consider the treatment of stricture of the urethra as to the ultimate result; and I will quote from a few writers on this subject, in order to give you their views. Duplay writes, "Finally, it cannot be too often repeated that the cure of stricture of the urethra is never radical and final, no matter what

method of treatment may be employed ; and that relapses will inevitably occur if care be not taken to maintain the results obtained, by means of treatment continued, so to speak, indefinitely." Hamilton says, "For it must be understood that, in whatever manner the relief of the stricture has been obtained,—whether by dilatation or by rupture, by caustic or incision,—the result is the same : the stricture will inevitably return unless the use of instruments is continued." Agnew writes, "The radical cure of stricture I believe to be beyond the reach of surgery. . . . Experience, therefore, to say nothing of the anatomical peculiarities of the tissue which constitutes the coarctation of the urethra, compels me to speak strongly on this subject ; and, if it savors of dogmatism, it is that which originates in an honest conviction of the truthfulness of the statement, in maintaining which I find myself in the company of many good surgeons who entertain similar views." Harrison says, "When a stricture is once allowed to become cicatricial in its character, you may palliate or adapt, but you can no more restore his urethra than you can, by dissection or any other process, remove a scar from his skin. You can stretch the narrowed urethra to a size corresponding with the natural dimensions of the canal, and, in the great majority of instances, by a moderate amount of care and persistence in treatment, you can keep it so stretched." When writing of the operation of internal urethrotomy, the same author says, "The operation has not been followed by permanent benefit. Some of the worst cases of stricture that I have had to treat have been those where internal urethrotomy had been previously performed." Thompson writes, "The treatment has yet to be devised which will remove absolutely and forever the occurrence of recontraction in a patient once the victim of an organic stricture." Gerster writes, "A perfect restitution of the normal state of affairs is never to be expected after the treatment of a cicatricial stricture, be this treatment dilatation alone, or cutting combined with subsequent dilatation." On the contrary, Wyeth writes as follows : "The prognosis after urethrotomy should be guarded. Many cases do not recur, but a stricture of long standing, with extensive induration, no matter how thoroughly divided and carefully treated, tends to recur. . . . That the milder forms of annular stricture may be permanently cured by judicious treatment is satisfactorily established." Keyes says that "in the light of modern experience it may be safely stated that all true strictures of the pendulous urethra may be radically cured by free cutting internally." Otis writes that "the complete division of the cicatricial tissue producing such contractions may be followed by an entire absorption of the

cicatricial or stricture tissue, and this quite independently of the long-continued use of sounds." Further he says, "I would like to be distinctly understood as claiming, that stricture, as ordinarily met with, is *absolutely within the reach of curative measures*. If completely divided, and the division maintained by suitable means until healing of the parts has occurred, no *recontraction* can ever take place." Again, "Dilatation, temporary or persistent, is *never more than a palliative measure*, unless carried to a point sufficient to *completely rupture the stricture*." Finally, Otis writes, "I am a believer in the *true curability* of urethral stricture; . . . that complete division of stricture at *any* point results in the *immediate disappearance* of the stricture."

From the above quotations it is seen that we have advocates upon both sides of the question, and each is strongly impressed with the correctness of his own opinion; and it must be confessed that they both present a very favorable view,—indeed, so much so that in order to come to any satisfactory conclusion one is much perplexed. Where such diversity of opinion exists, is it not possible that both are in the right? In a measure I believe this to be the case,—that is to say, I think the lesion is at times to be treated by the cutting operation, and again there are cases in which the procedure of dilatation is equally as effective as the cutting. To say that all strictures are to be dilated is no more justifiable than to say that all strictures should be treated by the cutting operation. Again, to my mind, one of the factors which has given rise to this difference of opinion is that many are striving to accomplish what I believe to be an impossibility,—that is, the restoring of a urethra which has been the seat of an organic stricture to its previous normal condition. In many cases, indeed in the great majority, we are able to relieve, we occasion the disappearance of all symptoms for a longer or a shorter period; but a permanent or radical cure rarely, if ever, in my opinion, takes place. I say this knowing well the claims made by others of obtaining results which are lasting. I hesitate very much in differing from the opinions of many of these surgeons; but their experience has not been mine, their results I have not obtained. I do not believe this has been owing to any fault in my methods of operating, which I will speak of later; but, as previously mentioned, we cannot restore the normal tissue of the part, on account of both anatomical and pathological reasons. First, anatomically, it is not possible to prevent the contraction of a canal with flexible walls which has been surrounded by a deposit of cicatricial tissue, the inherent property of which is to contract. The contraction under these circumstances must narrow a canal when the canal has no fixed point

of support. Second, pathologically, there is no means that I know of which will produce a tissue which is not cicatricial ; certainly cutting will not, and dilatation cannot. It is, therefore, for these reasons that I believe the permanent cure of stricture of the urethra to be beyond the science and art of surgery.

Believing, as I do, that gradual dilatation and internal urethrotomy are both excellent methods of treating strictures of the urethra ; that both are capable of giving good results ; in fact, that they are the only methods which should be employed in the treatment of this lesion, with the exception of external urethrotomy or perineal section, reserved for special conditions in which neither dilatation nor cutting is proper, the question naturally arises when to cut and when to dilate, since, as above stated, one method is not suitable for all cases. My experience has taught me that there are some strictures which do well under the treatment by gradual dilatation, others best by the operation of internal urethrotomy, and again a few which seem to be intractable to all procedures. Admitting this to be true, it would, of course, be of great assistance if we were able to classify our cases, but, unfortunately, we have no absolute rule to govern us. It may in general terms be said that the location of the stricture, in the urethra, has some influence upon the result of treatment, and upon indicating the method to be adopted for its relief. Thus, when the lesion is located within three or four inches of the external meatus, the cutting operation may prove the most satisfactory ; when deeper, dilatation may give good results. There is, however, a considerable amount of uncertainty in adopting this rule, and, where a doubt exists, I think it best to give the patient the benefit of the doubt, and, if there is in the different operations any advantage in regard to the risk he will have to be exposed to, that which is less dangerous is undeniably, in my opinion, the method to be first employed.

This, of course, brings up the question of the comparative danger of the two operations. I may state here that, in my judgment, any operation upon the urethra, even the careful passing of a sound into the bladder, is done with some risk to the patient, and should never be unnecessarily or carelessly performed. In regard to dilatation and urethrotomy, they may both be done so badly that considerable injury, if not a fatal result, may be the consequence ; and, again, either operation may be looked upon as free from danger if properly done ; yet, from my observation, the comparative dangers or complications which may follow either operation are much less with the operation of dilatation than they are with urethrotomy. I know that many surgeons

believe the latter operation to be absolutely free from all risk, and declare that they have never had a fatal result: this latter claim may be true, and I can say the same for myself; but I have had more and much sicker patients after the operation of internal urethrotomy than I have ever had after dilatation. Dilatation is, therefore, the treatment to be preferred when the comparative danger of the two methods is considered. Do not misunderstand me: I do not wish to convey the idea that I consider the operation of cutting a dangerous one, or even an operation of any great risk for the patient to undergo; but when the comparison is made between it and dilatation, my experience has led me to choose the latter.

We now take up the technic or method of performing internal urethrotomy and gradual dilatation. First, internal urethrotomy; and I desire, before entering into the details of the operation proper, to direct your attention to the preparation of the patient, previous to the operation. This I believe to be a very important, if not the most important, part of the treatment. The first thing to be ascertained is whether the patient is or is not the subject of any pathological lesion of the kidneys; since experience has taught surgeons that any surgical operation, whether performed upon the genito-urinary tract or elsewhere, but more especially upon the former, is not advisable if any morbid condition is present in the kidneys. Therefore, a careful examination of the urine is always to be made previous to operating, and the result of such an examination will greatly influence your prognosis. It is desirable that the patient should be placed in bed a day or so before the operation, the bowels opened by a slight laxative, and all mental anxiety removed, if possible.

One of the objections, and also one of the dangers, in performing any cutting operation in connection with the urinary tract has been the risk the patient ran of having the operation followed by what is termed urethral fever. The etiology of this fever has been differently given by those who have investigated it. Some believe that it is due to a nervous shock, others that the injury to the urethra causes it, and again others that it is owing to the absorption into the system of the urine through the wound. Be this as it may, it is, to my mind, quite definitely settled that one of the causes of this fever is the absorption of the decomposing urine at the seat of the cutting. The demonstration of this may be very clearly shown in cases where, by some means, the absorption of the products of decomposing urine is prevented; under such circumstances the fever does not occur. In order to prevent the absorption of the products of decomposing urine after operations upon

the genito-urinary tract, we may employ one of the following methods. Either the urine is prevented from coming in contact with the cut surface and there undergoing decomposition, or the urine itself is made aseptic, so that it will not decompose. To prevent the urine from coming in contact with the wound and there decomposing, a perineal section or external urethrotomy is done, and then the urine is drained from the bladder through this opening. The rendering of the urine aseptic is accomplished by the administration of some drug which is excreted by the kidneys and which, when in the urine, prevents its decomposition. Such a drug we have in boracic acid; salol has also, it is said, the same effect. These drugs will so act on the urine that it does not undergo decomposition, and therefore there cannot be any absorption of the products of decomposing urine. To show that the administration of boracic acid does so act as to prevent the urine from decomposing, I may mention that I had quite recently a very positive demonstration, in a case of stricture of the urethra. The patient had a very sensitive urethra; even the most careful passing of a steel sound was always followed by an attack of urethral fever. Wishing to do the operation of internal urethrotomy, for two days previous to operating I administered ten grains of boracic acid four times a day, and also washed out the bladder with a solution of the same drug at the time of operating. The cutting was done, and the man recovered without having any symptom of urethral fever. This result, I am quite satisfied, could not have been obtained if some such method had not been employed. Therefore, one of the dangers of cutting operations in connection with the genito-urinary tract may be avoided by adopting some antiseptic method. I may say it is not well to depend too much upon the administration of boracic acid alone, but at the time of operating the bladder and urethra should be carefully and thoroughly washed out with an antiseptic solution, of which there is none better than the boracic acid, or a weak solution of the bichloride of mercury,—one to ten thousand.

In order to wash out the bladder and urethra, the method advocated by Lavaux, a French surgeon, is, I think, the best, as it does away with the necessity of passing an instrument into the bladder. It is on the principle of hydrostatic pressure, and consists in having a small nozzle about one inch in length attached to a rubber tube three or four feet long; this tube is connected with a vessel capable of holding one or two quarts of fluid. The nozzle is introduced into the urethra, and the vessel which contains the antiseptic fluid is elevated three or four feet above the patient. By gravity the fluid passes into the bladder,

and, when the patient has the desire to urinate, the nozzle is removed from the urethra, and the bladder allowed to empty itself. This process is repeated until it is thought that the tract is sufficiently washed. At times when the patient has a very irritable bladder, which will only retain a very small quantity of fluid, it is advisable to first throw in a weak solution of hydrochlorate of cocaine,—four per cent.,—which will lessen the sensibility of the mucous membrane, and then the washing may be accomplished without any difficulty. Of course, if the above apparatus is not at hand, the ordinary syringe and catheter may be employed. I wish to impress upon you the importance of this preliminary preparation of the patient, since not only does the success of the operation in a great measure depend upon such a preparation, but the danger to the patient is almost entirely removed.

The patient having been prepared, we are ready to perform the cutting, and the question of giving an anæsthetic is to be decided. In my own practice I do not consider it, except in very rare cases, necessary to administer an anæsthetic. The operation is quickly done, it is not very painful, and, what is more important, I think it necessary to have the patient in a condition to answer my questions. If, however, the patient is very susceptible to a little pain, and very much fears the operation, then a solution of hydrochlorate of cocaine, five per cent., may be injected into the urethra. This will somewhat lessen the pain, but it has not in my hands caused complete anæsthesia of the canal. Let me here remark, in regard to cocaine, that I do not consider it a harmless preparation, for more than once death has resulted from its use; whenever you have occasion to employ it, do so with very great care and in weak solutions, as it may prove itself a poison, and a fatal one.

In reference to the instrument to be used in performing internal urethrotomy, I have for the past five or six years confined myself to Otis's dilating urethrotome, and believe it to be as nearly perfect as possible. The only objection to this instrument is that it is necessary to have the stricture dilated to at least twenty millimetres before the urethrotome can be introduced. In order to understand the application of this instrument, it is necessary that the views of Otis should be explained. He believes that every urethra has its own definite calibre, and, to ascertain what this calibre is, he has formed the rule that there is a definite relation between the circumference of the penis, when not erected, and the calibre of the urethra. Thus, if the penis measures three inches in circumference, the urethra should measure thirty millimetres, and for every quarter of an inch increase in the circumference of the penis, the calibre of the urethra increases two millimetres. This

is what Otis calls the normal physiological calibre of the urethra, and he thinks that to obtain good results from the operation of internal urethrotomy it is necessary to restore the urethra to its normal calibre. Upon this latter point I am in accord with him,—that is to say, when you cut, cut to the full size of the normal urethra.

Before the urethrotome is introduced,—or, rather, before the cutting is done,—the exact location of the stricture is to be determined, and this is ascertained by means either of the acorn-shaped bulbs or the urethra-metre. The urethrotome is now introduced, with its blades closed, to a point about a quarter of an inch beyond the stricture; the blades are then separated to put the stricture thoroughly on the stretch. This is a most important part of the operation,—viz., to have the stricture well stretched before the cutting is done,—and generally the patient is the best judge of this; he will complain of the pain the stretching occasions; for this reason I prefer not to give an anæsthetic. The knife-blade of the urethrotome is now drawn through the contraction, and then pushed into its concealed position; the blades are now separated, in order to dilate the urethra to its normal calibre, which you have previously ascertained by measuring the circumference of the penis. If this cannot be done without using too much force, the knife is again to be drawn through the stricture, and again the dilatation is repeated. Formerly I placed a large-sized flexible catheter in the bladder after the operation, and allowed it to remain in position for forty-eight hours; but since I have been using such thorough antiseptic precautions I have dispensed with the catheter; it is a foreign body in the canal and bladder, and if it may be omitted, so much the better. The washing out of the urethra by means of an injection of an antiseptic solution—boracic acid—after each act of urinating is, I believe, advisable, more especially when the catheter has not been employed. An opium-and-belladonna suppository is placed in the rectum, and the patient put to bed, where he should remain several days. The administration of boracic acid is continued, which generally is all the medication that is necessary; of course, if there is much pain, an anodyne is given.

The cutting of a stricture, it is to be remembered, is only the beginning of the treatment; the after-care is very important, and the final result depends very much upon how the patient has been treated during the week or two after the urethrotomy. The contraction has been cut, and if left alone it will, from the nature of the tissue, again contract; therefore, the urethra must be kept dilated to its full extent, or to the size you have cut it, and in order to do this sounds must be

passed for a certain length of time. The point upon which there is not uniformity of opinion is when to begin the introduction of the sound. Many surgeons, if not the greater majority, advise that the sound be passed every day, immediately after the operation, until the wound is healed, or until it passes through the stricture without any difficulty. I do not follow this plan, for several reasons, but wait until the cut in the urethra has healed, or until the patient passes no blood when urinating and there is little or no pain during the act. This is usually at the end of the first week. By adopting this plan I avoid giving the patient very much pain, do not keep up the irritation in the canal, and do not delay the healing of the wound. You can understand that the daily opening of the wound by the passing of an instrument will to some extent hinder the cicatrizing of the cut; but by waiting until a slight cicatrix has formed you can then pass a sound with very little pain, and the irritation is trifling. The objection to this plan of not immediately passing a sound after the operation is said to be that the wound has contracted again, and the operation has failed. I have found, however, that this is not the case; if there is any contraction in the short space of time you have waited, it is so very slight that it is immaterial, and the nature of the very recently formed cicatricial tissue is such that it readily yields to the dilating process of passing the sounds.

There is one point which I think it worth while to remember,—and that is, not to begin the dilatation with the largest-sized sounds. For example, if the stricture was cut to take thirty millimetres, and this size was passed at the time of the operation, when you begin the dilatation begin with several sizes smaller, say twenty-two millimetres or twenty-four millimetres, and gradually every day increase the size, until the full calibre of the urethra is reached.

The frequency of introducing an instrument will depend upon the amount of irritation it occasions; at first it may be passed every day, if it is followed with no unfavorable symptom, such as unusual amount of bleeding, irritation of the bladder, great pain, chill or fever. In most cases the sound may be passed every day until the full calibre is reached; when this is accomplished, then every other day for a week, then twice a week, then once a week for a month, then once a month for two or three months. If in the last two or three passings the instrument enters without any difficulty, or, in other words, there has been no contraction, let the patient alone for six months, and, if at the end of this time there is still no indication of any contraction, then the case may be discharged, with the advice to return at once if there is

noticed any return of the slightest symptom indicating a relapse of his trouble.

Passing now to the method of treatment of stricture of the urethra by gradual dilatation, I may say that by this I mean dilatation in the true meaning of the word, which is to widen, to stretch, to dilate. It is not a tearing, a rupturing, a divulsion, but a gradual increase in the size of the lumen of the contracted urethra by means of sounds. The operation of passing a sound may prove a very simple one, and, fortunately, in most cases it is ; but it may, on the contrary, be a serious, if not a fatal, procedure. I do not say this to give you the impression that the introduction of an instrument into the urethra is to be considered as something beyond the province of the general practitioner, but wish to emphasize the importance of never passing an instrument into the urethra unless you are well satisfied of the necessity of so doing.

In regard to the instrument, I prefer the steel sound provided with the Thompson curve, and I do not think it safe to employ one smaller than eight millimetres ; indeed, when you go below this size, you have a very dangerous instrument to use in a pathologically-changed canal, and the risk of making a false passage is very great ; therefore, when it is necessary to employ a sound smaller than eight millimetres, I always use a flexible instrument.

In the process of dilatation it is important to locate the stricture, and this is done by means of bulbous sounds or the urethrametre. My reason for ascertaining the seat of the stricture, when I propose to treat it by gradual dilatation, is that I believe the passing of the sound farther than a short distance beyond the point of the contraction to be unnecessary, if not harmful to the patient. When you consider that the prostatic region of the urethra is the most sensitive part of the canal, and very liable to resent any unnecessary surgery, it is evident that your instrument should not be passed into the bladder. I am quite convinced that many cases of irritable prostatic conditions are caused and continued by the abuse of the sound in the treatment of urethral stricture. To avoid this irritation of the prostatic region, I think it well to employ a sound, which has been recommended, so constructed that it cannot be passed into the bladder,—that is, a straight sound of not more than four or five inches in length ; and in those cases in which it has been necessary for the patient to continue the passing of an instrument himself, I generally have made for him a sound of the proper circumference and of a length sufficient only to reach just beyond the seat of the contraction.

The question of the frequency of passing the sound—the length

of the interval between each dilatation—is very often asked, and I may say that you can lay down no absolute rule; every case must be treated for itself; what in one is the proper interval may in another be too frequent. If you remember that gradual dilatation, in the treatment of stricture of the urethra, is most satisfactory when performed in such a manner as to cause the least possible irritation to the canal, you will then not be hasty in too frequently passing the sound. I know of no better way of ascertaining when the sound should be again passed than to consult the patient. That is to say, when all the irritation of the last passing of the instrument has ceased, or there is no pain during urination, you may safely repeat the operation. This interval I have found to be in most cases twice a week. The gradual increase in the size of the sound is of importance, and it is well not to be too hasty in this respect, since by avoiding all that may give rise to any complication you will sooner accomplish the desired amount of dilatation, and, from experience, I have come to the conclusion that an increase of two millimetres at each sitting is sufficient, and very seldom gives rise to any undue irritation. By adopting the plan of passing the largest-sized sound which was passed at the previous sitting, and following it by one two millimetres larger, you will rarely cause any complication, and accomplish the dilatation with satisfaction. I grant you that the temptation to dilate the contraction more rapidly is in many cases very great; but if you will take my advice, and not let the wishes of your patient influence you to proceed with more speed, you will often save yourself many regrets and your patient much suffering.

A very important part in the treatment of stricture of the urethra by gradual dilatation—indeed, I look upon it as one of the most important, in so far as the more lasting (I will not say radical) result is concerned—is the extent of the stretching. The mistake has been and is still made of not carrying the dilatation far enough, and I have no doubt that is one of the reasons why this method of treatment has not been followed by as good results as it should be. The same rule ought to be applied to gradual dilatation as that which we employ in internal urethrotomy,—viz., the calibre of the urethra is to be restored to its physiological size. Therefore, measurements must be made, and the treatment continued until we have accomplished our end. The method of treating by gradual dilatation until most of the symptoms were relieved, and the patient made no complaint, which was formerly advised, is not sufficient, and the relief is not so lasting as when the dilatation is carried to the full extent of the normal calibre of the canal.

It must be confessed that this method of treatment by complete dilatation is frequently difficult to carry out,—not, however, on the part of the surgeon, but owing to the patient being satisfied with what you have accomplished, and neglecting to continue his treatment, until he is again troubled with a return of symptoms of his contraction.

A word in reference to the question of the preliminary preparation of a patient in whom it is proposed to treat a stricture by gradual dilatation. In the very great majority of cases this preliminary preparation is not necessary, yet I would caution you to use every care at the first passing of an instrument into the urethra, and, if you find that it is followed with no unfavorable symptoms, there is no call for any further preparation; but, if the operation is the occasion of any unfavorable symptom, the same preliminary treatment should be adopted as recommended when speaking of internal urethrotomy.

It may appear to you that in my directions for performing the operations of internal urethrotomy and gradual dilatation I have been too minute, and dwelt too much on the details,—in fact, been describing unnecessary trifles; experience, however, has taught that it is the careful attention to small things and the carrying out of minute details which draw the line of demarcation between the successful and the unsuccessful surgeon; and not only this, but it may be that by neglecting to observe such trifles and details the patient's life is endangered, if not lost.

In conclusion I may recapitulate as follows. The pathology of the lesion—stricture of the urethra—is such as to make the treatment by gradual dilatation more rational than that of internal urethrotomy. The ultimate result of either form of treatment is believed by many able writers on the subject never to be a radical cure, and in this opinion I concur, stating, however, that, while I do not believe that the normal condition of the urethra can be restored, there are occasional cases in which the contraction does not return either after the cutting operation or after gradual dilatation. As to the comparative risks of the two operations, my experience has led me to prefer dilatation. For these reasons I advocate, in the treatment of stricture of the urethra, the method of gradual dilatation, as I have described it. This not relieving the symptoms,—and, as I have mentioned, all cases cannot be treated by the same method equally well,—then internal urethrotomy is to be done.

TUBERCULAR DISEASE OF THE SKULL; MOVABLE BODY IN THE KNEE-JOINT.

CLINICAL LECTURE DELIVERED AT THE BUFFALO GENERAL HOSPITAL.

BY ROSWELL PARK, A.M., M.D.,

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AN Italian child has been sent here from the Eye and Ear Dispensary for examination with reference to a diseased condition about the head. The child is so restless that I am having it chloroformed. It is two years of age, and has had a lump on the side of the forehead for a year, and one lower down over the zygoma for two or three weeks. There is keratitis on the right side; the cornea is infiltrated to such a degree that it is only translucent, resembling a piece of ground-glass, instead of being clear as it should be. The parts are evidently congested and the general picture presented by the eye is that of a case of inherited syphilis.

On the side of the head, you see through the dirt and hair a fluctuating swelling which, as I press around it, gives the peculiar sensation of something which has burst through the skull, flaring up the edges of the opening in the bone. I cannot, however, press back the contents of the tumor into the skull, and consequently cannot think that this is a vascular tumor; moreover, there is no pulsation transmitted from the brain.

Below this swelling is another one. I do not detect any fluctuation transmitted as I press first over one swelling and then over the other. The lower swelling looks more inflammatory and was the more tender of the two when I touched it before the child was anesthetized.

Dentition is pretty regular. On the left side of the lower jaw there is a slight swelling which seems hard. It moves with the jaw and is therefore connected with the bone. Underneath the jaw there are separate enlarged glands. In the neck I discover no such glands as I

should expect, and there is no abdominal enlargement. The general appearance of the child is tubercular.

On inserting the aspirating-needle into the lower swelling I am able to move it freely as if it were in a cavity, and I withdraw pus, as I was led to expect by the heat, tenderness, and redness, and by the statement that the growth had come within two or three weeks.

The upper tumor does not give the same sensation to the touch, and, if it contain pus at all, is probably a cold abscess. I expect to find disease of the periosteum and of the outer table of the skull. The syringe must be cleansed before introducing it into this second swelling, for if it does not already contain pus, I do not want to introduce any. The needle moves around freely in this swelling also, but its calibre is too small to allow pus to come through. A larger needle, however, removes a little thick pus and touches bare bone. It is therefore a cold abscess.

We have done the child no harm and have made the diagnosis of tubercular disease,—old above but fresh below ; and on the left side of the inferior maxilla there is probably disease of the same kind, only not yet in the stage of degeneration. It is a bad outlook for the child to have so much tubercular disease and so marked a diathesis. The treatment is clearly indicated, free incision, scraping away the external table of the skull,—although there is hardly a distinction of tables yet—and the evacuation of these tuberculous deposits. I have not the authority to operate now.

MOVABLE BODY IN THE KNEE-JOINT.

I shall next bring before you a case of much pathological interest, although it requires no major operation. It is a condition that frequently eludes detection, and causes considerable discomfort and disability. This young man is twenty-one years old. He complains of a trouble with his knee which came on suddenly a year ago. He had not hurt his knee in any way previously, so far as he remembers. The first symptom was sudden pain and loss of function, which lasted a short time, leaving the leg sore for two days and rendering him unable to follow his trade—that of a moulder—during this time. In the past year he has had similar attacks three times ; twice within the last month. He came to my office three or four months ago, simply giving this account of his trouble, and I was able to feel something at the inner side of the patella, which slipped away when I pressed upon it. That was enough to furnish a clue. The diagnosis was that of a moving or floating body in the knee-joint. The only radical and effi-

cient treatment is its removal ; but this hinges on the ability not merely to find it once but to hold it and get at it. There are several reasons why the German name *gelenkmaus*, or joint-mouse, is a good one. It creeps in and slips out from under the patella. Sometimes there is one of these bodies, sometimes two or three are present. I have here several specimens of similar bodies removed by operation in this clinic. You can readily imagine a little mass like one of these getting caught between the joint-surfaces and causing instantaneous pain and inability to straighten the leg. Sometimes these symptoms are repeated every day, sometimes at greater intervals. Sometimes, by an inadvertent movement of the knee, the disability is relieved ; at other times the patient has to twist and move the knee in various ways in order to become temporarily rid of the *gelenkmaus*. There may be considerable secretion of synovial fluid induced by the presence of this foreign body. In the hip, shoulder, and elbow the same condition has been reported, but it is rare. The crucial test of the correctness of the diagnosis is, of course, the finding of the body.

Two weeks ago the patient came to me again with a history of two recent attacks, and he wanted something done to relieve the condition. I then told him that he must study up his own case, and play with his knee till he discovered just the trick of dislodging this thing from the place where it usually locates itself and bringing it around where he could always find it, and where I could find and keep it, in order to accomplish its removal. If he could not succeed in this, we might almost dissect the knee without finding it. The patient has just caught it between his thumb and finger, but as I manipulate it, it slips away like a mouse. It is of importance that I should be able to find this, for during the operation I cannot, of course, permit him to handle the joint. If there is any one operation, especially one of minor importance, which I am particular to perform with the strictest asepsis, it is this. Those of you who are accustomed to see antiseptic work know that things usually go on very smoothly, and yet this little operation, which is so plainly indicated, has had in the past a large mortality,—according to Barwell a death-rate of twenty-one per cent.,—just from the little incision into the joint. That mortality is now entirely done away with through the use of aseptic methods.

I employ, as you see, cocaine anæsthesia. I make an incision parallel to the inner border of the patella down to the synovial membrane. I do not open this latter, however, until I am able to secure the body. After considerable delay, due not to the difficulty of finding the body, but of hooking it with the tenaculum, I am able to secure it and

remove it. The wound is now sprayed with bichloride solution, sutured with catgut, sprinkled with iodoform, covered with iodoform gauze, and then with absorbent cotton, and finally secured by a bandage. Lastly, I place the leg on a posterior splint for the purpose of maintaining absolute physiological rest.

Next to knowing how to recognize and treat these cases, it is of interest to account for them, and this is the most difficult part of the subject. The following is a table of six possible explanations applicable, respectively, in different cases. This arrangement closely follows Ambrose Paré, although it is taken from Barwell's book on diseases of joints.

1. *Hypertrophy and Metamorphosis of the Synovial Fringe*.—A synovial fringe is best illustrated by the ligamentum mucosum and the ligamenta alaria. A fringe may hypertrophy and form a little nodule, which becomes crushed off or torn loose in some movement of the joint. It is aseptic and protected from all possibility of infection, and experience shows that such a little separate particle will harden, condense, and become almost of the consistence of cartilage.

2. *Hypertrophy and Metamorphosis of Extra-Synovial Tissue*.—That is, of tissue around the joint, and yet not really in the joint-cavity. Suppose, again, there has been a blow or injury of some kind and a hemorrhage and exudation. The new-formed material projects into the joint, bulging in the synovial membrane, and may then be torn loose as in the first explanation.

3. *Periosteal Outgrowth*.—This amounts virtually to a tumor, since it has no physiological function. It grows in the direction of least resistance,—into the loose tissues of the joint,—and by some accident it is broken off or gradually worked loose by the constant movement of the joint.

4. *Organization of Effused Fibrin and Blood*.—This, as well as the first, is quite common. From some stab-wound causing hemorrhage or some cause of acute inflammation, there is a fibrinous exudation, the effusion organizes by metaplasia and is moulded into the shape of that part of the joint in which it nestles most of the time.

5. *Cartilaginous Outgrowth*.—That is, an ecchondrosis from one of the cartilages of the joint. This is not so very rare. Sometimes the masses are very small, at other times quite large. In any of these cases there may be a number of foreign bodies just as there may be a large number of little rice-grain bodies in synovial bursæ.

6. *Detachment by Injury of some Normal Tissue*.—This is ordinarily cartilage or bone. Suppose, for example, a man is kicked in the knee

by a horse ; the sharp part of the shoe may catch the upper end of the tibia so as to chip off a little piece. If there be no external wound the injury will probably be aseptic and the material will not suppurate, but will become rounded off and adapted to the shape of its resting-place.

This classification does not recognize another form of trouble,—a dislocated semilunar cartilage. These cartilages usually become detached by accident, and when they are once broken loose from the ligaments which hold them to the tibia they become movable bodies in the joint, giving rise to about the same symptoms, except that they do not move very far from their proper place. A person with this disability usually learns the trick of putting them back. Relief is to be afforded in the same way as in the case of an ordinary *gelenkmaus*,—i.e., by removal.

There is no domain of surgery in which there has been a greater advance since the era of antiseptis began than in these operations on the knee-joint. The mortality of twenty-one per cent. which formerly attended this operation was the result of blood-poisoning from sepsis due to dirty skin, dirty hands, dirty instruments and dressings.

[This patient recovered without a bad sign or symptom, and left the clinic in just a week, with perfect function of the joint.]

STAB-WOUND OF THE CHEST; TUBERCULOUS DISEASE OF THE TARSUS; OPERATION.

CLINICAL LECTURE DELIVERED AT THE CINCINNATI HOSPITAL.

BY P. S. CONNER, M.D.,

Professor of Surgery, Medical College of Ohio, Surgeon to Cincinnati Hospital, etc.

I AM informed, gentlemen, that there has been admitted into the house, since my last visit, a case of stab-wound of the chest. I will have it brought before you and examine it in your presence.

The man came in at one o'clock this morning. The temperature was, unfortunately, not taken until a short time ago. It is now 99.8° F.; the pulse about 85. The patient has no pain, except in the region of the wound,—i.e., in the right chest near the axilla. He has been coughing very little, and has no pain on tranquil respiration. The wound has not been probed. The man's countenance is not anxious, to say the least; the wound has been dressed; an antiseptic bandage has been applied, and I do not think it is wise to interfere with the dressing at present.

There are two questions to be determined as quickly as possible in a case of this sort. First, is there penetration? Second, is there any threatening amount of hemorrhage going on? The question of penetration is in very many cases by no means an easy one to solve. The wound is small; it may be, and probably will be, closed very well—in a part of it at least—by the time that you see it. There may be little or no discharge of blood and none of air whatsoever, and the question of penetration must be determined in one or other of three ways; either by watching and waiting, by the revelations of the thermometer, or by the actual investigation of the wound itself by the probe. Now, it is a fact that has been long known among surgeons that the ordinary use of the probe in wounds of the great cavities is not good surgery, and such use in cases of penetrating wounds—especially of the abdomen—is to be permitted only on condition that, if penetration be found to have occurred, the opening shall be made as free as possible, so as to permit

of thorough exploration. It may be said that there are no risks in the proper use of the probe; that the instrument, if it be aseptic, does no harm, as it by no possibility will infect the wound. Now, this is true in a measure, but I think only in a measure. There is a certain amount of risk attending the use of the probe even in careful hands and when thoroughly prepared, since adhesions may be broken up and clots disturbed. Probing, as done under ordinary circumstances, is exceedingly bad practice. Let a man be picked up on the street with a stab-wound, and let him be carried, as is usually done, to the nearest drug-store. A half-dozen doctors will be called in. Each will rush in with dirty finger and dirtier probe, or with dirty probe and dirtier finger, and each will pass such finger or probe into the wound, with the result of tearing up whatever adhesions may have occurred, loosening any clots that may have formed, with the additional possibility, not to say probability, of infecting the wound. It is impossible to teach men, apparently, that they can do vastly more harm with their probes than has been done by the knife or bullet in its passage, and yet the fact remains. I was exceedingly gratified, when examining this case, to hear the Internes, in answer to my inquiry, say that the probe had not been used. It certainly shows that the men who have charge of cases here are wiser than many who have charge of cases of this sort. If it is important that the presence or absence of penetration should be ascertained at once, then disinfect your hand and use your finger if the wound be large enough; if it is not, then use your probe, letting it drop by its own weight, and determine the depth of the wound by seeing how far it goes.

After determining in this way that penetration has occurred, what are you going to do? You will probably close up the wound, not hermetically seal it, put on your antiseptic dressing, keep the man as quiet as possible, and let nature repair the damage as she will. However, it is not necessary in very many of these cases, perhaps not in any of them, to determine by finger or probe whether penetration has occurred or not. I have over and over again taken occasion to refer to the fact that there is a vast deal of information to be obtained in these cases from the use of the thermometer. It was very clearly shown by Redard, in the Franco-German war, that early and long-continuing depression of temperature is so generally associated with penetrating wounds of the great cavities that the law may be considered universal. When penetration has taken place in a wound of any one of the three great cavities—the thorax, the abdomen, or the cranium—the primary depression of temperature remains an unusually long time,

and is well marked ; so that, after a lapse of four, five, six, or eight hours it will be below normal, and even after the lapse of a considerably longer time it will be found ranging not above 100° F. No harm comes to the individual in ascertaining knowledge in this way, and we have the satisfaction of knowing that there is or is not the condition in which lies the chief gravity of the case, to wit, penetration. The temperature which this man has is not at all low, not lower than it would be after an ordinary wound. I ask that hereafter, for those that are to come under my care, whenever a man is brought into the house with a stab-wound or a pistol-wound, that is likely to involve any one of the great cavities, his temperature be taken at the time of admission, and once every hour for at least six hours afterwards.

This, then,—the fact of penetration,—is the first thing to be determined ; the second is whether hemorrhage is going on. Now, hemorrhage may be either external or internal. If external, it tells its own story ; there is no difficulty in understanding it, and if very considerable in amount it will probably come from one or other of two vessels, according to the position of the wound with reference to the chest wall,—either from an intercostal artery or from the internal mammary. Fortunately wounds of the internal mammary are of rare occurrence ; and when they do occur, they are associated with injuries of such parts that the arterial wound is probably of only secondary importance. Wounds of the intercostal arteries are not at all infrequent. They are not so frequent as you might suppose, however, because nature puts the artery away under cover where it is not likely to be injured ; and it is not the easiest thing to reach the intercostal artery intentionally. But if it is injured, there may be troublesome hemorrhage, troublesome principally in its arrestation. How are you to stop it ? There are two ways of doing this, either by plugging or by ligation, and ligation is by far the more important and more serviceable to have recourse to. But as the intercostal artery is put away under cover so that it is not likely to be injured, so on account of its position the ligation becomes difficult. You may be able to pick up the vessel under the lower border of the rib ; but you may be unable to do so. How then are you to control the hemorrhage ? This is best accomplished by throwing a ligature around the rib, which you can generally do without much trouble, securing a mediate if not an immediate compression of the vessel ; but plugging answers well in many injuries of this sort. How are you to plug ? Not by simply pushing cotton or lint into the wound. What I say here of an intercostal is true also of

the internal mammary artery. Take a bit of cloth and thrust it down into the wound like a glove-finger through the opening, then stuff it with cotton or wool. If, now, you draw on the external part of this glove-finger, you bring the lower end up against the inner surface of the rib, and the result is that you have a very decided pressure brought to bear upon the wounded vessel, and that plug may be left for any length of time necessary to insure closure of the arterial wound.

Now, supposing hemorrhage has been internal, coming from the divided intercostal or from the vessels of the lung divided at the same time, or from the vessels of the pleural cavity (a considerable hemorrhage may come from the last of these sources). I have very recently seen an interesting case of hemorrhage occurring in an acute pleuritis. From the whole surface of the pleural sac blood was poured out to mingle with the fluid that was already in the chest cavity ; this hemorrhage, if not of very great amount, is a source of danger according to the septic or aseptic character of the wound. If the wound be infected, either at the time of injury or afterwards, we have in the blood-clot the culture medium that is most favorable for the rapid development of organisms, and the individual will be subjected to a vast deal of risk in consequence. If, however, there is no infection of the blood that is poured out, it is practically encapsulated, absorption takes place, and recovery follows. If there is a large amount of blood poured out, there will certainly be danger of injurious pressure being made upon the lung ; and I have seen the worst of results in consequence of hemorrhage thus taking place, producing a compression of the lung, which continuously increased. If you let this go on long enough the individual will certainly die. A good deal of loss of blood may occur in any wound and the individual not be very seriously injured, but there will come a time when the condition will become serious because of the drain. As a rule, I think without question, where grave symptoms do manifest themselves in these lung wounds, it is on account of interference with aeration, in consequence of direct pressure on the lung and prevention of its due expansion. Under such circumstances, what are you to do ? It is a very serious question what is best to be done in many of these cases. There are two methods of treatment that have been in vogue for a long time. One is the encircling of the chest with a very firm bandage that restricts the movements of the part, which does little good ; and the other is free bleeding from the arm. The older military surgeons directed that the individual should be freely bled from both arms, if necessary, until fainting occurred. By this course you are knocking a man down with one hand while you are

trying to pick him up with the other; the bleeding that you do does not make him any better able to stand the conditions which come afterwards, and between the two great losses of blood the man is very likely to go off. Of late years surgeons have asked the question (and it has been answered in the right way), "Why not treat an effusion of this character like any other effusion into the chest cavity? What is the use of letting blood pour out here until fatal compression of the lung takes place? Why not open the chest freely and wash out the clots, and if it is possible get at the bleeding vessel and tie it, or, if need be, stuff the whole cavity with antiseptic gauze?" I believe that this is the true way to treat penetrating wounds of the cavities, associated with great extravasation, rip the chest wide open, turn out the clot; and, if the hemorrhage does not stop, stuff the cavity.

In this case everything promises a fair course. As you see, the appearance of the man is not that of a very badly injured individual.

EXCISION OF THE TARSUS.

Here is a man whom some of you may remember, on whom I operated three weeks ago for removal of the anterior tarsus and of a large portion of the metatarsal bones. You can see that the edges of the cut have largely united, and that the deep wound has filled up to such a degree that there is sufficient firmness to support the anterior part of the foot, and to prevent its dropping forward. Will there be a regeneration of bone? I doubt it. I do not think that in any of my cases there has been any very extensive redevelopment of bone. Recently we have had reported a case in which the skeleton of the foot, with the exception of a portion of the tarsus and perhaps a portion of the metatarsus, was removed, and ultimately the skeleton had been entirely reformed—certainly a very gratifying result. I fear that it will be found that a large portion of the solidity is due to fibrous, not bony formation. You will remember that the condition of this foot at the time of the operation was not a very promising one. I debated whether it was wise to attempt to save any part of it. I now think, however, that the man will make a good recovery.

I sutured three tendons in this case. Recently, within the last year, we have had reported a case of tendon-suture that is exceedingly interesting, where in an injury of the hand, attended with considerable loss of substance, it was found that the lower part of the flexor tendon of the index-finger could not be sutured to its upper portion, and the operator fastened it to the tendon of the next finger, with the result of securing very excellent union, the individual in time being able to

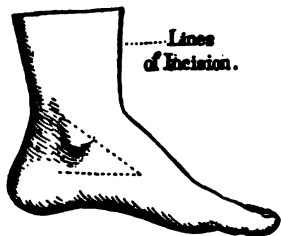
move the index-finger freely in conjunction with the middle one. In the course of time, moreover, we are told that he was not only able to thus move it, but there was secured a separate and independent movement of the index-finger itself. How this was possible, I confess, I do not understand.

TUBERCULOUS DISEASE OF THE TARSUS.

The next case that I bring before you is one of tuberculous disease of the lung and of the ankle. There have been a number of operations devised for the relief of these ankle cases, but they are numerous for the simple reason that perhaps no one of them has quite filled the bill. The readiest way of gaining access to the joint is by making an incision from malleolus to malleolus, but there is the serious objection to this that you divide the tendons and the anterior tibial artery, the division of the latter not being a matter of very much moment; but if you ever can avoid the cutting of such a large trunk, do so. I purpose this morning making an incision over the outer surface of the joint; whether I shall add to it an inner incision or not will depend entirely upon the freedom with which I am able to get at the parts after the outer incision is completed. This case has been attended with an unusual amount of pain.

We will apply the Esmarch bandage, although I ordinarily do not use it in such cases, since this man is not in a condition to lose very much blood.

The incision is made V-shaped, one arm above, the other below the malleolus, and the flap turned back. The astragalus is then dissected out, and portions of the adjoining bones, including the lower extremities of the tibia and fibula, are removed with the cutting forceps and scraper. The diseased parts of the bones are very soft and spongy, and a considerable amount of gelatinous matter is removed from the vicinity of the articulations and tendons.



Working under cover, as I am here doing, I shall of necessity have some difficulty in clearing the astragalus, but I should much rather do it in this way if possible. You can recognize as I proceed that I am coming down upon healthy bone, the difference of the sound produced by the forceps and scraper being easily recognized.

The only objection to the operation that I have just done is that

the peroneal tendons are necessarily divided, but this is not of much moment, while it gives us excellent access to the bones of the ankle. It is a question of some importance whether it is advisable to make a counter-opening on the opposite side of the ankle for drainage. If I can get drainage enough with the opening I have made on one side, I shall not make the counter-opening. You will find that thorough drainage very often means through drainage. It is a very simple matter to make the counter-incision here, as it is only necessary to puncture the skin and fascia, which alone remain on the opposite side. I shall therefore make this incision and pass a drainage-tube through. Having sutured the divided tendons, using silk, I now pack the wound well with iodoform-gauze, and close the incision in the skin by means of silk sutures.

SCIRRHUS OF THE BREAST; STRETCHING OF THE SCIATIC NERVE; PAINFUL TUMOR OF THE BREAST; EXCISION OF HEAD OF FEMUR; FINGER AMPUTATION; HEMORRHOIDS.

CLINICAL LECTURE DELIVERED AT THE HOSPITAL OF THE UNIVERSITY OF
PENNSYLVANIA.

BY JOHN ASHHURST, JR., M.D.,

Barton Professor of Surgery, and Professor of Clinical Surgery in the University of
Pennsylvania.

SCIRRHUS OF THE BREAST.

THE first patient that I show you to day is a woman with a mammary tumor, which I believe to be a scirrhus. I am led to think so from the fact that the tumor has been present for two years without causing much pain, that it is a somewhat circumscribed growth, occupying the tissues of the breast itself, and that the skin over it is disposed to dimple. When we attempt to move the skin over the tumor we find that it is adherent, and that the skin shows a tendency to dimple. This is one of the most significant signs of this form of malignant growth, and will often serve to distinguish it from other varieties, especially encephaloid cancer and sarcoma, which, although not cancerous, is often equally malignant. This dimpling is seen in the most marked degree in what is termed lardaceous scirrhus, which is one of the most malignant forms of carcinoma of the breast. In such cases, the skin may be dimpled over a large area, giving much the appearance of pig's skin, as you see it in saddles. Those of you who are in the habit of riding on horseback know that the hog's-skin saddle shows little dimples at the points where the bristles have been. In malignant growths this dimpling is due to numerous adhesions between the skin and the underlying mass. When you find this developed to a great extent it is always a sign of unfavorable prognosis.

This case is about as favorable for operation as any case of cancer

of the breast can be. There is no ulceration ; there are no deep adhesions ; and there is no manifest glandular enlargement. My own experience with these cases is that scirrhus invariably returns, sooner or later. The cases in which it has not recurred have been those in which the patients have died of some other affection in the mean time. If, however, you can relieve a patient for a number of years, until death comes in the natural course, you have accomplished a great deal. I have seen cases in which there has been no recurrence for six or eight years. There are undoubted cases where the period of immunity has been as long as ten years. If we can add this much to life, we accomplish a great good even if the disease eventually recurs.

The patient's skin has been thoroughly cleansed, and a corrosive-sublimate dressing has been applied to the chest for some hours. This we now remove. You can see the tumor and note the dimpled appearance of the skin. Unless I find glandular enlargement, I prefer not to open the axilla. In removing the breast you may sometimes use a circular incision, which has the advantage that it permits the wound to be brought together in any desired direction. This incision is particularly useful in large tumors where much skin is involved. Where you are satisfied that you are dealing with a malignant tumor, you should remove the entire breast and include a good portion of the integument. It is safer to remove too much than too little. As in this case the tumor occupies principally the lower portion of the breast, I shall employ an elliptical incision, embracing the nipple, removing the whole breast, and taking away as much as possible of the fat surrounding the gland. It is an important point that the tumor should not be exposed during the operation. If it is malignant, the liability to recurrence is increased if even a microscopic portion of the tumor is left in the wound, and there is of course less danger of this if you can remove the tumor with a wall of healthy tissue around it.

The hemorrhage from this operation is usually not great. We control it with ligatures. Having stopped all bleeding, I shall paint the wound with a solution of chloride of zinc, as recommended by the late Mr. De Morgan, of Middlesex Hospital, London. While of course the chloride of zinc is an antiseptic, yet the particular object of Mr. De Morgan in using it was to destroy any minute particles of the growth that might be left in the wound. I do not know that it has such an effect, but at least it does no harm. Mr. De Morgan recommended a rather strong solution, but in one case in which I applied a solution of twenty-five grains to the ounce, a linear slough was formed over the whole wound, so that for many years I have used not more than fifteen

grains to the ounce, which does not produce a slough and is probably as efficient as a stronger preparation.

In all operations upon the chest it is important to keep the patient well covered. Of course the removal of the mammary gland brings the thoracic cavity near the external air, and if care be not exercised the patient may take cold, and the operation be followed by pleurisy, congestion of the lungs, or even pneumonia. If the wound is a large one, it should be kept protected so that all of it may not be exposed at the same time. As you observe, when I apply the chloride of zinc it gives a brick-dust color to the surface, so that the contrast with any bleeding point is very marked.

All hemorrhage having been checked, a large rubber drainage-tube is laid in the bottom of the wound, a safety-pin being passed through each end of the tube to prevent it from slipping in. The skin at the lower angle of the wound is divided so as to leave no pocket for the collection of fluids. The wound is then brought together with silver wire. After it is closed, the lower opening of the drainage-tube is stopped while a hot corrosive-sublimate solution ($\frac{1}{1000}$) is injected into the wound through the upper end of the tube, distending the cavity so that it reaches every point. It is then allowed to escape. In this way we are sure that everything is perfectly clean. The line of incision is covered with a strip of protective soaked in a corrosive-sublimate solution; over this are placed several layers of wet sublimated gauze, constituting the deep dressing; then the superficial dressing of dry gauze, with a sheet of Mackintosh or water-proof paper, and finally a layer of sublimated cotton held in place by a bandage, the arm also being secured to the side.

[The wound united by adhesion, and the patient made a rapid recovery, leaving the hospital in a little over a fortnight.]

STRETCHING OF THE SCIATIC NERVE FOR SCIATICA.

The next patient is a man suffering with inveterate sciatica,—that is, pain in the course of the sciatic nerve. He has been under treatment for a long time, and has pretty thoroughly exhausted all known remedies. As a last resort, I have recommended to his physician stretching of the sciatic nerve, which at least can do no harm, and which sometimes affords temporary if not permanent relief. The operation of nerve-stretching has the great advantage over excision of a portion of the nerve that it does not cause paralysis. We can therefore stretch nerves much more freely than we can resect them. Resection of the sciatic nerve has been performed in some cases, but it is apt to be fol-

lowed by trophic changes and ulceration in the parts below, so that sometimes the remedy is worse than the disease. As I have said, nerve-stretching is not accompanied by that risk, and it often gives temporary and sometimes permanent relief.

The effect of nerve-stretching, or elongation, as the French call it, is not confined to the part operated upon, but it is found that there is a reflex effect brought about on the other side of the body, showing that the central nervous system is to a certain extent affected by the operation. This is perhaps one reason why it does good. It is not merely the local procedure, which might be of service in breaking up adhesions, but there is a reflex effect brought about through the spinal cord on the nerves of the opposite side.

This operation is, however, often disappointing, because the neuralgia may be of central or spinal origin. The neuralgia may be relieved in one part by nerve-stretching to reappear in another part. You should bear in mind that it is well not to promise too much. The great point in favor of this operation is that it will do no harm. If the neuralgia returns in another part, it is a thing to be regretted; but if, after paralyzing the part by nerve excision, the neuralgia should return in another part, it would be a much more serious matter.

The sciatic nerve is found midway between the trochanter major and the tuber ischii. It is such a large nerve that there is usually not much difficulty in finding it. By an incision in this region, dividing the gluteus muscle, the nerve is brought into view, but before stretching it we will tie some arterial branches and control all bleeding. After exposing the nerve, the best plan is to raise it on a blunt hook or director, and then get the fingers under it. The nerve is pulled upward, then downward, and then forward, sufficient force being used, as a rule, to lift the limb from the bed. Such force can be applied without danger, though it would of course be possible to apply enough force to rupture the nerve and do a great deal of harm. After the nerve is thoroughly stretched, it should be carefully laid back in its sheath and the tissues closed around it. We do not want to cause any unnecessary disturbance. Before bringing the edges of the skin together, I lay a small drainage-tube in the bottom of the wound and bring the cut muscular fibres together with catgut sutures, then closing the external wound, washing the tube out with the corrosive-sublimate solution, and applying the ordinary antiseptic dressing.

I have successfully stretched the nerves of the brachial plexus in two cases, with great relief to the patients. I have also several times stretched the median and musculo-spiral nerves, and once before the

sciatic. In that case the patient was a nervous, neuralgic woman, and although the operation gave entire relief so far as the affected limb was concerned, yet, as I have said sometimes happens, the pain returned in the other leg, and she had sciatica on the other side of the body.

[The wound healed readily, and the patient was relieved by the operation, though slight pain was still occasionally felt in the region of the hip.]

SMALL PAINFUL TUMOR OF THE BREAST.

Our next patient has a painful affection of the breast, or rather of the axillary region. On palpation, I detect a little enlargement. It may be that there is a small fibrous growth in connection with a branch of a nerve, constituting a neuroma, which is analogous to the painful subcutaneous tubercle met with in the extremities. This gives rise to intense pain, and usually consists of a small fibroma, implicating a nerve or developed between its fibres. Sometimes the breast itself is neuralgic. It is barely possible that this is a minute outlying portion of the gland tissue, similar to the supernumerary glands sometimes met with. I shall remove this little mass by a simple incision. It proves to be a supernumerary development of breast tissue embedded in a mass of fat. A drainage-tube will be inserted and the wound closed in the ordinary way with an antiseptic dressing.

EXCISION OF HEAD OF FEMUR IN HIP-JOINT DISEASE.

This patient is the boy who was operated on before you seven weeks ago. You will remember that it was a case of hip-joint disease of long standing, with firm bony ankylosis between the femur and the pelvis, and with seven or eight sinuses discharging profusely. The lad has done well since the operation, although the wound has not entirely healed, and we have accomplished all that was expected, since I said at the time that it was probable that some of the sinuses might remain, but that we should succeed in diminishing their number and in lessening the amount of discharge by removing the diseased bone. We found the head and neck of the femur carious, and removed these, thoroughly scraping and gouging the acetabulum, and taking away all the diseased bone that it was possible to find. The patient is much improved in general condition, and I think that soon we shall be able to get him up, first in a wheeled chair, and afterwards on crutches.

When we dress this wound we have the patient turned on his side. In the earlier stages the foot and limb were held by an assistant, who kept up extension, but the lad is now so much better that he can

turn and hold himself pretty comfortably in the desired position. The wound is solid, and we have a certain amount of motion at the hip-joint. We of course do not want bony but fibrous union. As you see, the skin is quite red over the sacrum, and at one time there was a little fear of a bed-sore. The corrosive-sublimate dressing excoriated the part a little, but it soon healed under the application of boracic-acid ointment. Where you find that the patient has a tender skin, it is often well to apply boracic or some similar ointment inside of the dressing to prevent too much irritation. In dressing this wound we dust iodoform over it. I do not use iodoform in recent wounds, but in suppurating wounds it has a good effect, especially where the lesion is of a tuberculous character as was the case here. We are now using boracic-acid ointment on the wound, with a corrosive-sublimate dressing over all.

You see that the boy has a certain amount of power in the limb, and can move the foot and leg in various directions. He can almost lift the limb from the bed. We shall now allow him to have a bed-rest, which will enable him to flex the hip. Then in a short time he will be permitted to get in a wheeled chair, and will soon be given a pair of crutches. The limb is so much shortened by the operation that there will be no danger of it striking the ground. The limb will swing, and its weight will tend to keep up a certain amount of extension.

FINGER AMPUTATION.

This young man met with an accident a few days ago, by which he lost a portion of the middle finger of the left hand. The finger was severed exactly through the second phalangeal articulation, all the tissues being cut on the same level. Under these circumstances, I have advised that the remainder of the finger be amputated. Where only a single phalanx is left it is of very little use. In the case of the middle and ring fingers the rule is that where it is necessary to amputate above the first joint, amputation at the metacarpo-phalangeal joint should be recommended. If only a portion of one phalanx is left it is apt to project, and is in the way. Even when the whole phalanx is left it is apt to be in the way. In the case of the forefinger, the little finger, and still more the thumb, we should, on the other hand, save as much as possible. Either of these fingers with the thumb gives the power of prehension, and even if there is only half an inch of the thumb left, it makes a useful member.

In amputating the finger at the metacarpo-phalangeal articulation the best operation is that with the oval or racquet-shaped incision, with

the point of the racquet on the dorsal surface in the case of the middle finger and ring finger, on the radial side in the case of the forefinger, and on the ulnar side in that of the little finger. Beginning on the dorsal surface, I make a straight incision over the joint, and extend a branch on either side of the finger, joining the two lateral incisions by a transverse cut on the palmar surface. The operation is the same in principle as that known as Larrey's amputation, at the shoulder-joint. The phalanx is disarticulated from the metacarpal bone and removed. The question whether the head of the metacarpal bone should or should not be removed depends somewhat upon the individual. It makes a more symmetrical hand if the head of the bone is removed, but, on the other hand, the part is not as strong as if the head of the metacarpal bone is allowed to remain. In working-men, and in the male sex generally, it is to be recommended, therefore, that the head of the bone should be allowed to remain, but in many females, and where there is no particular necessity for a strong hand, the removal of the head of the bone may be advisable, as lessening the deformity.

We usually find three arteries that require ligatures: the two digital arteries and a small branch besides. I use here a hank of catgut as a drain. The edges of the wound are brought together with silver wire and the usual antiseptic dressing applied. The hand is placed upon a splint, and the arm will be carried in a sling.

HEMORRHOIDS: LIGATURE.

This man is the subject of long-standing hemorrhoids requiring operation. Hemorrhoids, or piles, is decidedly the most common affection, met with in the rectum, that comes under the observation of the surgeon. At the same time, I do not know that operations for piles are as often required as for fistula. This, however, depends a good deal upon the surgeon, whether or not he considers it proper to operate in all cases of piles. My own belief is that the majority of cases of hemorrhoids do not require operation. The patients can usually be made comfortable by regulation of the diet, attention to the state of the bowels, and the use of topical applications. If the piles are painful, anodynes may be used locally. If the itching is distressing, the dilute nitrate-of-mercury ointment, one part to seven, is of service. By these means the majority of patients can be made comfortable, and an operation is not needed. I only recommend an operation where the patient is losing a great deal of blood, or where the size of the tumors is such as to cause discomfort or obstruction, or where the piles are painful, or where there is some special reason rendering opera-

tion desirable. On the other hand, fistula requires operation because, in the majority of cases, it can be cured in no other manner. Operation is always to be recommended unless there is some contra-indication. Where, however, the fistula is associated with tubercular disease, it is better to avoid operation.

Hemorrhoids, for the sake of convenience in description, are divided into two varieties,—internal and external. Internal hemorrhoids are those which arise above the sphincter, and are covered entirely with mucous membrane. The external are those which are found on the outside, and are covered with skin. In practice we find that many hemorrhoids originally internal have gradually come down so that they finally occupy a position outside of the sphincter, and the mucous membrane covering them gradually assumes the appearance of skin. These are properly denominated muco-cutaneous piles, because they are partly covered with skin and partly with mucous membrane.

If any operation is required in the case of piles which are entirely external, all that is necessary is to cut them off. The blood-supply is scanty, and if there is bleeding it can be readily controlled.

Where the piles are internal, covered with mucous membrane and above the sphincter, it is not well to cut them at all, but to employ some other method, the plan which I prefer being the ligature. There would be here great risk of hemorrhage in simple excision.

The muco-cutaneous piles are best treated in the same way, or cutting may be combined with ligation, making first a deep groove through the cutaneous surface and then sinking the ligature in this. The nerve-supply is principally from the cutaneous surface, and the pain which accompanies strangulation is largely due to pressure upon these nerves. The vascular supply is near the mucous membrane, so that by cutting a deep groove through the skin and sinking the ligature in it we avoid both the hemorrhage and the severe pain.

There are other operations which may be employed. The clamp and cautery has strong advocates both in England and in this country. This operation consists in applying a clamp with an ivory surface to the pile. Then the greater portion of the mass is cut off, leaving a small stump which is thoroughly seared with the hot iron.

Another plan is the application of caustics, such as nitric acid. This is best adapted to certain very vascular piles, where the surface presents a granular appearance, and which are sometimes termed "strawberry piles."

There is also the treatment by the injection of various substances, particularly carbolic acid. In certain cases this will give relief. I

have, however, known of a number of cases treated by injection, where, while the hemorrhage was stopped, the hemorrhoidal tumor remained, and was so annoying that the patient desired an operation for its removal. Carbolic-acid injections are not as popular as they were some five or ten years ago.

On the whole, I think that the ligature is the safest and altogether the best method of treating piles. In this operation I use a very strong ligature of double length, which is well waxed, and then soaked in an antiseptic solution. This ligature is threaded in a needle with its eye near the point. The needle, by means of the holder known as Bushe's, is passed through the pile from within outward, the pile being grasped by ring forceps. The thread is then cut, and I have the base of the pile transfixed by a double ligature. A deep groove is now cut on the cutaneous surface, and each half of the pile is securely tied. With a heavy ligature it is better to use the ordinary reef-knot, or a triple knot, rather than the surgeon's knot. After ligation the projecting portion of the pile may be cut away with curved scissors, taking care to leave sufficient tissue to prevent slipping of the ligature.

Before undertaking any operation on hemorrhoids, it is well to dilate the sphincter, not only to facilitate access to the piles, but also to diminish the liability to strangury and retention of urine which is apt to follow all operations on the rectum. Sometimes dilatation of the sphincter will of itself give temporary relief, because it diminishes the pressure upon the returning venous circulation. Dilatation should be practised slowly and carefully, and is more difficult than you would suppose from the descriptions sometimes given. You read about the surgeon introducing his thumbs and promptly stretching the sphincter to the tuberosities of the ischia, but where the patient is muscular it requires considerable force to accomplish even a moderate amount of stretching.

The patient is purged before the operation. Usually a dose of castor oil is given the night before, with an opening enema in the morning, so as to empty the lower bowel.

In regard to the pathology of piles, I may say that they are not simply varicose enlargements of the hemorrhoidal veins, but that there is also a positive new formation of tissue, analogous to what is seen in *nævus*. It is a mistake to think that they are simply varicose veins.

I have now removed five piles from this patient in the manner described. If there should be bleeding from the groove cut in the skin, a ligature should be applied to the bleeding point. An opium

suppository is introduced into the rectum, and an ordinary antiseptic dressing applied. The patient should be given one grain of opium, or its equivalent, night and morning, for seven or eight days, so as to lock up the bowels until the abdomen begins to feel slightly full. Then by stopping the opium a spontaneous evacuation will probably be obtained in the course of twenty-four hours, and just before the motion is passed an enema with soap and oil may be administered, so as to soften and disintegrate the fæcal mass. The ligatures usually drop about the eighth day, and the granulating surfaces which are left may advantageously be brushed over with a weak solution of silver nitrate, and dressed with boracic-acid ointment. The patient should be restricted to liquid food until the bowels have been relieved.

ROUND-CELLED SARCOMA OF THYROID; ABSCESS. SIMULATING HERNIA.

CLINICAL LECTURE DELIVERED AT BELLEVUE HOSPITAL.

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ROUND-CELLED SARCOMA OF THYROID.

GENTLEMEN,—The first case that will be called to your attention to-day is one with disease of the thyroid gland.

The following is a brief history of the case: J. E., aged fifty-six, male, was admitted to the hospital January 15, 1891. He has good family and acquired histories. About October 20, 1890, he first noticed a small tumor at the right side of the neck, tender to the touch but not painful, and moved upward and downward with the act of swallowing. It grew slowly for the first month, then very rapidly, and the tenderness increased. Acute and continuous with occasional severe darting pains in the right side of the neck and head began about November 15, and pain with swallowing also commenced at this time. During the last four weeks he has been able to swallow liquid diet only. Permanent hoarseness appeared January 17, although it had been present at intervals before this time. The tumor measures six and a half inches in the transverse and four inches in the longitudinal diameter. It is now scarcely movable; is elastic, with slightly nodulated surface and rounded borders. It extends well under the right clavicle and beneath the upper end of the sternum. The upper limit is the body of the hyoid bone. Swallowing scarcely causes movement of the growth, due, no doubt, to its adhesion to contiguous tissues. The right portion of the gland is much the larger, though the left displaces the trachea and œsophagus outward at least two inches from the median line. Owing to displacement, the carotid of the right side is pulsating on a line with the middle of the clavicle of that side. The rapid growth and the fixedness of the tumor are strongly suggestive of malignancy.

Exactly what will be done will depend on the developments as the operation proceeds. The first incision, as you will see, is made at the right side in the direction of the long axis of the tumor, short at first, and carried down to the growth. The superficial tissues are certainly not involved except by the inordinate stretching. However, the deeper ones, as the sterno-thyroid and sterno-hyoid muscles, are involved, being matted with the tumor beneath. They are likewise infiltrated either with the disease peculiar to the growth or from inflammatory products. If the former, it argues bad for the complete removal. I have now reached the sac, and can with difficulty separate the infiltrated tissues from it, above and below. At the sides, however, the sac is broken through and its contents are limited by a more extensive infiltration of the contiguous tissues. From the opening at the right side of the sac an abundance of cheesy matter escapes mixed with a small amount of purulent-like fluid. I will cut open the sac and empty its cavity, which will enable me to study its connections more carefully, and will also afford more room for manipulation. It is filled throughout its entire dimensions with cheesy matter which can be washed and scraped away. The rigid walls can now be examined with regard to extent and thickness, as well as the structures associated with them. The removal of the contents causes no marked diminution in the limits of the tumor. It now appears that the right carotid sheath and its associated structures are adherent to the wall of the tumor. The posterior wall is adherent to the tissues beneath. If the tumor be non-malignant there is no justification of proceeding further, as suppuration is almost certain to occur. The portion of the sac below extends down to the junction of the upper two pieces of the sternum. This I can remove, but to do so will take away the only barrier to the entrance of inflammatory products into the thorax, and its removal cannot materially benefit the case. I will, therefore, sew the edge of the sac to the external wound, and pack the cavity with iodoform gauze. If the disease be simple in nature, which I doubt, it will recover kindly under antiseptic methods. If it be malignant, it is now too extensive to warrant entire removal without the concurrence of the patient, owing to the involvement of the important cervical structures by the disease. If it be malignant, the tension incident to the continuous growth will be so much lessened by the incision, I hope, as to relieve the pain and admit of better alimentation. It is proper to add that if it be malignant it is intensely so, and the growth will soon be seen protruding through the wound, which protrusion reduces the pressure to a minimum, in such cases.

Later Note.—The growth proved to be a small, round-celled sarcoma, which rapidly increased in size, filled the sac, and extended to the surrounding tissues. Still, when the patient left the hospital, two weeks later, he could swallow solid food and suffered no pain. During this time, however, emaciation and cachexia with rapid failure of the vital forces were apparent.

ABSCESS SIMULATING HERNIA.

C. F., male, aged fifty-eight, good family history. He has a double complete inguinal hernia, but in other respects has been in excellent health, with unimportant exceptions, all his life.

During the night, about two weeks ago, he was attacked by a severe fit of sneezing, quickly followed by pain in the "small of the back" at the right side. In the morning he found a "lump" at the back, which was neither tender nor painful. The tumor continued to increase slowly in size. His functions are all normal.

Examination reveals a tumor about the size of a lemon situated immediately below the last rib and at the outer border of the erector spinæ muscle. It is tense but not tender, is elastic, has an impulse with coughing, and is dull on percussion. It can be reduced incompletely by gradual pressure. Position of the body does not appear to influence its characteristics. The diagnosis in this case lies between abscess and hernia. If an abscess, it is, I believe, either perinephritic or associated with disease of the spine. If a hernia, it is either devoid of a sac, or adhesions exist within the sac. In support of the latter hypothesis we have the suddenness of its occurrence following muscular violence, and the existence already of inguinal hernia, suggestive of relaxed fibres. The impulse on coughing and straining, quickly followed by increased size and tension, can be credited to hernia, especially in the absence of anything suggesting abscess-formation so associated with the respiratory forces as to cause these phenomena, as is sometimes the case. I will not introduce an exploration needle, because it can be of no use if it be an abscess, and might be harmful if it were a hernia. I will now make an incision directly down on it, going carefully so as not to injure the contents if it be a hernia. I find it to be an abscess, and shall follow its course with my finger. It passes beneath the last rib, upward by the side of the vertebræ as far as I can reach with the finger. This probe may go farther,—it does, but only about an inch or so beyond. Surely about eight ounces of pus have escaped. It is white, thick, with a tendency to curdiness, and is inoffensive. I am unable to understand the exact source, as there is nothing in the history of the

patient that throws any light on this matter. We will carry a drainage-tube to the highest point and pack the cavity around the tube with iodoform gauze. In conclusion, gentlemen, do not forget the instructive lesson taught by this unusual case.

Later Note.—The patient remained in the hospital two weeks, and on leaving there was but a very small amount of discharge of a purulent character. There was no pain, and nothing further could be elicited to throw light on the source of the pus.

**LITHOLAPAXY; ABSCESS OF HEAD OF TIBIA;
WIRING OF COMPOUND FRACTURE OF HU-
MERUS; EXCISION OF KNEE; TUBER-
CULAR SARCOCELE; CANCER OF
BREAST; TRACHEOTOMY IN
CUT-THROAT; WYETH'S
AMPUTATION OF HIP;
GASTROSTOMY.**

**REPORT OF A SERIES OF MAJOR OPERATIONS IN ST. AGNES' HOSPITAL,
PHILADELPHIA.**

BY JOHN B. DEEVER, M.D.,

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LITHOLAPAXY.

CASE I. — H. B., white, male, aged sixty-nine years, was admitted to the hospital August 24, 1890, complaining of frequent and painful micturition. The pain was described as sharp in character and referred to the end of the penis, and was most severe at the end of micturition. Examination of the urine showed the presence of phosphates, crystals of oxalate of lime, pus, mucus, and vesical epithelium. Examination of the bladder with the sound detected a stone of medium size and rather hard. The operation I hoped to do for its extraction was litholapaxy, and from the examination of the urine I felt satisfied that this was not contra-indicated by the existence either of a cystitis of too high a degree or of renal complications. By digital examination of the rectum, excessive enlargement of the prostate was next excluded. It having been demonstrated by examination with the sound that the stone was not so large as to render crushing impossible, the calibre of the urethra was then measured with the urethrameter and found to be thirty-two millimetres in circumference, and without stricture. To determine the tolerance of the bladder as well as its capacity, a saturated solution of boracic acid to the amount of ten ounces was injected through a Bozeman catheter. Finally two steel sounds, Nos. 30 and 32 (French), were passed into the bladder

upon two consecutive days. Neither of these operations was followed by a chill or any unpleasant result. I then had the patient prepared for the crushing operation, directing that the bladder be washed out twice daily with a saturated solution of boracic acid, and that five grains of the same drug be given internally with a half-glass of Buffalo lithia water four times daily. On September 5th the patient was etherized, the stone crushed and washed out with the Otis evacuator. The after-treatment was that used in preparing the patient for the operation with the addition of occasional doses of morphine. He was confined to bed but one week. Two days later he was discharged from the hospital. Examination of the crushed stone showed it to be oxalate of lime, weighing one hundred and fifty grains.

Before a surgeon can conscientiously decide upon the proper operative procedure in any given case of stone in the bladder, the course here pursued should always be followed, as there is no question in my mind of the superiority of litholapaxy over all other operations for stone when the conditions are favorable for it. It is true that suprapubic cystotomy has grown into favor of late, particularly among the younger surgeons. In certain cases it would seem to be the proper operation, but I cannot apply it as widely as do many.

ABSCESS IN THE HEAD OF THE TIBIA.

CASE II.—K. R., white, female, aged twenty-one years, was admitted to the hospital in February, 1890, with the following history. For the past five years she had noticed some swelling of the right knee at times. She sprained the right knee in December, 1889; as the result of which it became swollen, painful, and slightly flexed. She was treated for some time in the Pennsylvania Hospital, remaining in the ward five weeks, and was then referred to the out-patient department. In the latter part of February, 1890, the knee again became more painful, with marked swelling of the leg, particularly in the foot and ankle. On account of this recurring trouble the patient was admitted to St. Agnes' Hospital, where she was confined to bed and treated by the use of blisters, iodine, a posterior splint, etc. Internally she was given iodide of potassium and tonics.

In August, 1890, examination showed a circumscribed swelling corresponding to the head of the tibia, with œdema of the knee and leg. Any attempt to flex or extend the leg or any pressure made over the swelling was attended by pain. The pain in the limb was described as boring in character and more severe at night. The constitutional condition was that of mild sepsis.

Believing the case to be one of circumscribed osteo-myelitis, I ordered the limb to be made thoroughly aseptic, after which further examination was made under ether with the view of excluding knee-joint complication as well as of corroborating the diagnosis of disease of the tibia. An incision was carried through the soft parts over the tibia, which, when exposed immediately below the tuberosity, was seen to be enlarged. Trephining evacuated a collection of quite offensive pus, occupying the head of the tibia. The cavity was curetted, rendered aseptic, dusted with iodoform, and packed with iodoform gauze. The recovery was uninterrupted. I regret that I did not bone-implant the cavity, as I am in the habit of doing, which would have shortened the convalescence very materially.

Early interference, if it be nothing more than making an exploratory incision, is important in cases of this kind. Owing to the close proximity of the part of the tibia affected to the knee-joint, there is danger of the joint being involved by extension of the inflammation and a consequent osteo-arthritis. If by ulcerative inflammation of the articular cartilage of the head of the tibia a communication between the joint and the abscess-cavity be established, septic osteo-arthritis will be the result. This latter condition, if not seen very early and treated heroically, would in all probability necessitate amputation of the thigh.

The object of the exploratory incision is twofold,—first, for diagnostic purposes, and, second, to enable the surgeon to open the medullary cavity if it be found necessary.

WIRING OF THE HUMERUS IN A CASE OF COMPOUND FRACTURE.

CASE III.—W. K., white, male, aged twelve years, was admitted August 26, 1890, with the following history.

On August 16 he was gored by a bull, and received a lacerated wound of the right side of the neck and a compound fracture of the right humerus immediately below the surgical neck. Upon admission both wounds were sloughing. The lower end of the upper fragment was protruding through the wound of the arm. Owing to the septic condition of the wounds, especially that of the arm, it was thought best to apply a temporary dressing to the fracture and treat the wound antiseptically for a few days before wiring the fragments. The wound of the arm was treated by antiseptic irrigation (bichloride of mercury and carbolic acid), with the idea that this was more reliable in securing thorough antisepsis than the application simply of a wet dressing of bichloride gauze. On September 3, the wounds presenting a healthy

and apparently aseptic appearance, the boy was given ether, the fragments resected and wired, and the arm fixed upon an internal angular splint. A long, accurately-fitting shoulder-cap was applied over the dressing. Recovery was uninterrupted, and the patient discharged on October 11, 1890, with perfect use of the arm.

The only point about the case worthy of special mention was the treatment of the wounds antiseptically for some days before operating upon the fracture. Had the operation been done immediately upon the admission of the case, I believe there would have been some chance of a septic osteomyelitis following, as I question the possibility of rendering the involved tissue thoroughly aseptic by one washing,—that in preparing for the operation.

EXCISION OF THE KNEE.

CASE IV.—M. McD., aged four years, admitted September 15, 1890, for trouble of right knee. Examination showed the presence over the site of the patella of an unhealthy ulcer, at the bottom of which carious bone was felt. The joint was much swollen, red, tender to the touch, and flexed.

The child was put to bed, extension applied to the leg, the ulcer dressed antiseptically, and both sides of the joint blistered. As there was but little tendency to improve, it became evident that a septic arthritis was present, which was having a telling effect upon the child's general condition. It was thought best to excise the joint and remove the diseased patella. On October 21, 1890, due antiseptic preparation having been made, the child was etherized, and the joint opened by a transverse incision carried between the patella and the tuberosity of the tibia. It was then seen that the articular surfaces of both the femur and tibia were involved. Sections of the articular extremities were made, not including the epiphysial cartilages, and the patella and the diseased portion of the remaining synovial membrane removed. The leg was brought into an extended position, the wound dressed, a long posterior splint adjusted, and the limb placed in a fracture-box. The recovery was uneventful.

TUBERCULAR SARCOCELE; CASTRATION.

CASE V.—M. S., white, male, aged twenty-three years, admitted July 26, 1890. Family history of phthisis. Slight enlargement of the right testicle was noted about three months before, since which time it had been steadily increasing. The organ was not painful except when roughly handled, and the patient was prompted to seek

advice on account of the enlargement. Examination of the affected organ revealed the presence of irregular nodules. The patient denied having had syphilis. Examination of the lungs was negative. The disease was regarded as tubercular and removal was advised.

On August 7 the testicle was removed, the spermatic duct separated from the cord, and the latter tied with catgut and divided with the duct. August 21 the patient was discharged well.

My plan of closing wounds of this character is with the continuous catgut suture, omitting drainage. The observance of strict asepsis, the absolute arrest of all hemorrhage, the application of catgut ligatures, and thorough coaptation of the wound should always be followed by complete, rapid, and uncomplicated repair.

CARCINOMA (SCIRRHUS) OF THE MAMMARY GLAND.

CASE VI.—S. L., white, female, aged sixty years. Admitted September 1, 1890. Eighteen months ago she noticed a small and hard lump in the right mamma, which gradually increased in size. Examination showed the presence of a hard and irregular growth of the breast, with pain, which was lancinating in character and extended down the inner side of the arm. The axilla was also involved. The patient was advised to submit to an operation.

On September 6 the axilla was cleaned out and the entire breast removed, including the greater part of the infiltrated major pectoral muscle. The wound was drained with catgut and closed with a continuous catgut suture.

The patient was discharged on October 11, with slight impairment of the motion of the arm due to the removal of part of the pectoral muscle.

My present practice is to clean out the axilla first and then remove the breast, believing that in this way there is less likelihood of infecting the tissues of the armpit.

I first expose the axillary vein and work away from this vessel, taking care to preserve both the long subscapular and the long thoracic nerves.

The wounds should be closed with the continuous catgut suture, except where the flaps are scant. In this event it is better to use the aseptic silkworm-gut suture, owing to the tension to which the stitches are likely to be subjected. A few strands of catgut carried through a counter-opening, made to communicate with the most dependent part of the axilla, suffice for drainage in the majority of cases.

The modern practice of clearing out the axilla in removal of the breast for malignant growths, highly approved of by nearly all surgeons, should be invariably practised. Although to the sense of touch there may be no axillary involvement apparent, opening the axilla will reveal a different state of affairs in the greater number of cases.

I have demonstrated the correctness of the more radical procedure so often that I now think of doing no other. The objection that impairment of arm movement follows removal of the axillary glands cannot be substantiated. It is the faulty removal of these glands to which such a result is attributable. A clean dissection, duly regarding the nerves contained within the space, is not followed by impairment of motion. Tearing or gnawing out the glands, care only being taken to avoid injuring the axillary vessels, cannot be expected to be followed by other than impaired motion.

TRACHEOTOMY IN CASE OF CUT-THROAT.

CASE VII.—Mrs. T. G. W., aged thirty-one years, an inmate of the Norristown Insane Asylum on account of melancholia, was considered well enough to be granted a leave of absence on September 6, 1890. On September 8, 1890, while at home, she attempted to commit suicide by cutting her throat, and was admitted to St. Agnes' Hospital on the same day. Her general condition upon admission was that of a person who had lost a great deal of blood.

Examination revealed the presence of a wound, partly oblique and partly transverse, extending between the anterior borders of the sternomastoid muscles and on a line with the upper border of the thyroid cartilage. There was considerable bleeding, which was easily controlled by ligatures. The wound involved the following structures: namely, the skin, the superficial fascia, the platysma muscle, the deep fascia, the sterno-hyoid and thyro-hyoid muscles, the thyro-hyoid membrane, the epiglottis at the junction of its anterior and middle third, the left greater cornu of the hyoid bone, and the pharynx throughout its anterior two-thirds; the large blood-vessels at the side of the neck and the superior laryngeal vessels and nerves were intact. Breathing was labored, due to the contraction of the glottis and to the position of the larynx. The larynx was tilted forward, and the epiglottis severed, thus allowing the glottis to be clearly seen. The forward displacement of the larynx was attributable to the severing of the sterno-hyoid, thyro-hyoid, and the middle and inferior constrictor muscles of the pharynx; thus giving the control of the larynx to the

sterno-thyroid muscles which pulled it forward and slightly downward. Physical examination of the chest showed dulness on percussion over the lower portion of both lungs in front and behind. Upon auscultation coarse râles were heard over the dull area. The pulmonary embarrassment was unquestionably due to the blood finding its way into the smaller ramifications of the bronchial tubes.

Having arrested the bleeding and cleaned the wound, by far the most important question next to decide was how the wound should be disposed of, and whether the low operation of tracheotomy should be done before attempting to close it. I decided in favor of the latter, for the following reasons :

1. To limit the movements of the divided structures, particularly the pharynx and the epiglottis.
2. To relieve the patient of the necessity of expectorating through the mouth, and in this way to restrict the movements of the tongue, and give an additional factor in favor of a more rapid repair of the divided epiglottis.
3. To facilitate the apposition of the severed structures.
4. To render it possible to administer nourishment by the mouth earlier than otherwise could be done; since with the tracheal tube in position there would be less danger of food getting into the windpipe and lungs, and thus setting up a septic pneumonia. Under chloroform anæsthesia the trachea was therefore opened below the middle lobe of the thyroid gland, and a tracheotomy-tube of adult size introduced. The attempt to close the wound was not as successful as anticipated; as it was found impossible to approximate the partly divided pharynx. Simply the skin and fascia were therefore sutured. Nourishment was given by the rectum until the fifth day after the operation, when an attempt was made to pass a soft catheter into the œsophagus, through which to introduce food. As this proved unsuccessful, the rectal nourishment was continued until September 26, when the patient was able to swallow. The tracheotomy-tube was worn until October 9, owing to the presence of croupous pneumonia of the lower half of the right lung, lest the crippled larynx should not be competent to dispose of the material expectorated.

On November 1, the patient was discharged and taken back to Norristown, with slight defect of phonation.

I have seen a number of bad cases of cut-throat, in some of which, as in the one reported, I thought it well to open the trachea. This is the only one, however, in which recovery followed a wound so extensive.

AMPUTATION AT THE HIP-JOINT BY WYETH'S BLOODLESS METHOD.

CASE VIII.—A. L., white, female, aged twenty years; admitted February 25, 1888, with the following history:

In 1886 she fell down-stairs, injuring her left hip. Six months after the fall she commenced to have pain in the ankle, followed in a short time by pain in the knee, and some lameness of the affected limb which was more pronounced towards evening. These symptoms continued to grow worse, on account of which the patient applied for admission to the hospital. Upon admission examination showed well-marked coxalgia, with the limb flexed and abducted. The patient was put to bed and the ordinary extension-apparatus of adhesive strips and sand-bags applied, together with the constitutional treatment that is usual in cases of this kind.

In August, 1888, an abscess formed, pointing on the outer side of the joint. This was opened by Dr. John B. Roberts, then one of the visiting surgeons to the hospital. The patient remained in bed for the following seven months, after which she was allowed to go about on crutches. In October, 1889, Dr. J. Ewing Mears, the surgeon on duty at the time, excised the head of the femur and found it necrosed. At this time there were four sinuses leading to the diseased joint from different points. Three months after the operation she was again allowed to get up and use crutches, and continued to do so until September, 1890, when a second abscess developed upon the inner side of the thigh immediately below its junction with the perineum. On examination, I found an imperfect false joint, a number of sinuses, the abscess above referred to, and a very manifest enlargement of the femur. The constitutional condition was that of mild septicæmia. As the patient was at first unwilling to undergo further operation, the abscess was simply opened antiseptically. Both the local and general disturbance, however, increasing, she finally consented to an operation. On October 21, 1890, the patient having been etherized, the limb and adjoining surfaces were rendered aseptic, and an exploratory incision was made down to the false joint, and extending down the outer side of the thigh far enough to expose all of the diseased area. The amount of osteo-myelitis found showed that there was no question about the propriety of amputation. The limb was rendered bloodless by the application of the Es-march bandage. Two steel pins, each twelve inches long and one-quarter of an inch in diameter, were introduced upon either side of the thigh. The one, an inch and a half below and to the inner side of the anterior

superior spinous process of the ilium, was carried beneath the tensor vaginæ femoris muscle and emerged between the tuberosity of the ischium and the great trochanter. The other was introduced one inch below the level of the crotch, internal to the saphenous opening, and emerged one-half inch in front of the tuberosity of the ischium. The points of the pins were then protected by corks to prevent injury to the operator's hands. A piece of half-inch rubber hose six feet in length was wound tightly around the thigh above the needles and tied, and the Esmarch bandage removed. At a point five inches below the tubing a circular incision was carried around the thigh, through the skin and the superficial fascia, and both were dissected up to the lesser trochanter. The muscles and vessels were then divided and the bone sawn through on a line with the lower border of the lesser trochanter.

All of the vessels that could be seen were next securely tied, and then, by slightly loosening the tubing, the smaller bleeding points were detected and secured; after which the tubing was removed. The remaining portion of the femur was now removed by dividing the attached muscles as close to the bone as possible. This was much more difficult than is the disarticulation of the head of the bone. The flaps were finally brought together by silver wire sutures, ample drainage was provided, and an antiseptic dressing applied.

October 22.—The patient reacted well; complains of some pain and sick stomach.

October 23.—Better, not so much pain, vomiting less frequent.

October 24.—Wound dressed, looked well, very little oozing.

October 25.—Temperature $99\frac{1}{2}^{\circ}$ F. Pulse ninety-six. Little pain but still some nausea.

October 27.—Patient asked for something to eat; was placed on a light diet.

October 29.—Wound dressed and stitches removed. Slight sup-puration of inner angle of stump at the position of the drainage-tube.

November 5.—Drainage-tube removed, slight gaping at outer angle of stump. Packed with antiseptic gauze.

November 30.—Entirely well.

In the light of this case the following points suggest themselves for consideration.

1. The propriety of early excision in cases of coxalgia when abscess forms, rather than an operative interference directed solely to the abscess and to the obliteration of its cavity.

2. The removal of the limb in advanced cases of coxalgia in which

excision offers but a remote chance for repair, owing to the extent of the involvement of the shaft by a descending myelitis.

3. The propriety of making the section below the trochanters when the disease is confined to the head or to the head and neck of the femur.

GASTROSTOMY FOR CARCINOMATOUS STRICTURE OF THE ŒSOPHAGUS.

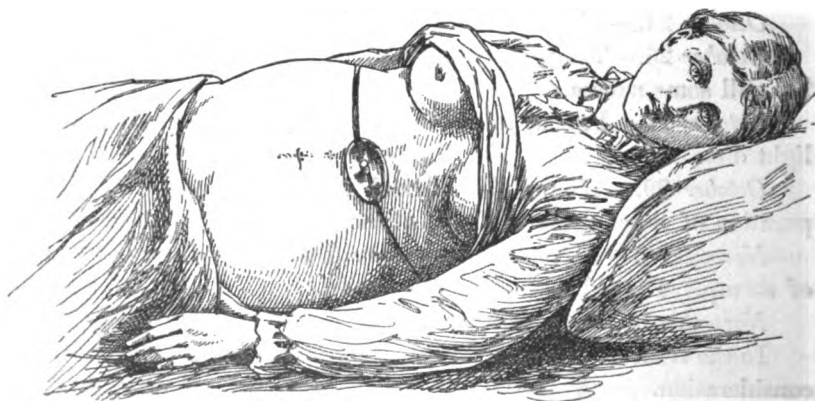
CASE IX.—M. M., white, female, aged fifty-two years, was admitted to the Medical Ward of the hospital October 10, 1890, and gave the following history. About May 1, as near as she could recollect, she began to have pain of a burning character at the lower part of the sternum. This continued to grow worse and was accompanied by difficulty in swallowing. Since August 1 she had not been able to swallow solid food, and any attempt to do so was attended by regurgitation both of the food and of offensive and blood-stained mucus.

Examination with graduated bougies showed the presence of an impermeable stricture located eight inches from the incisor teeth.

She was transferred to the surgical wards; the diagnosis of malignant stricture of the œsophagus confirmed, and gastrostomy advised.

Due preparation of the patient having been made, she was etherized on October 28, and an incision, three inches in length and commencing opposite the end of the eighth intercostal space, was carried vertically

FIG. 1.



Showing feeding-tube in position.

downward two inches to the left of the median line through the rectus muscle to the peritoneum. The peritoneum was next opened,

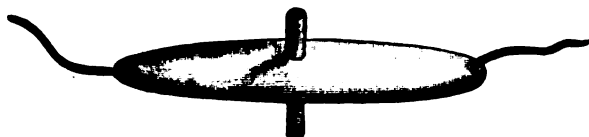
and, with the finger introduced into the abdominal cavity, the stomach was drawn into the wound and its anterior surface near the cardiac end at a point between blood-vessels was attached to the parietal peritoneum by a series of interrupted aseptic silk sutures; these included the skin, the superficial fascia, and the serous and muscular layers of the stomach. This completed the first step of the operation,—namely, gastrorrhaphy.

A piece of protective was placed over the wound, and over this a wet antiseptic dressing, antiseptic cotton, and a roller bandage.

October 31.—The wound was dressed, and the union found good. Every alternate stitch was removed. The stomach was next opened, and a soft rubber aseptic catheter passed into it and fastened to the abdominal walls by adhesive strips. Nourishment was now given through this, though from the time of the first operation until the stomach was opened it had been given by the rectum. During the convalescence there was not an untoward symptom.

November 15.—The catheter was removed and a silver tube introduced. (See Fig. 2.) From the date of the operation for a period

FIG. 2.



Feeding-tube with shield.

of four weeks, until her sudden death, on December 6, the patient was comfortable and free from pain.

Autopsy twelve hours after death. The chest and abdomen were opened, and the œsophagus with the stomach and the section of the attached abdominal walls were removed entire. A short distance above the stomach the œsophagus was the seat of a malignant stricture, and immediately above this it had ruptured. This rupture was evidently the cause of the sudden death, as the stomach itself was normal.

Gastrostomy, like colotomy, is, I believe, an operation which should be done earlier than is the practice with most surgeons. When the patient can no longer swallow semi-solid or pulpy food, and the stricture is not dilatable, gastrostomy offers the only means of relief and should be done at once.

The conditions for which the operation may be performed are malignant stricture of the œsophagus; malignant disease of the pharynx

or mouth; cicatricial contraction of the œsophagus; obstruction of the œsophagus by the pressure of growths outside of it; ulcerative destruction of the œsophagus; atresia (congenital) of the œsophagus.

In the case reported the operation should have been done much earlier, as there is no doubt that the ulcerative perforation and consequent rupture were precipitated by the irritation to which the part had been subjected both by the attempts at dilatation and by the passage of food.

I am inclined to take the same position regarding gastrostomy for otherwise unrelievable obstruction of the œsophagus as I do for colotomy for similar conditions of the sigmoid flexure and rectum.

To Dr. E. A. Bryant, resident surgeon in the hospital, I am indebted for the histories of the above cases.

I. WEEPING SINEW. II. SURGICAL KIDNEY OF THE LEFT SIDE.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC.

BY ARPAD G. GERSTER, M.D.,

Professor of Surgery at the New York Polyclinic; Surgeon to Mount Sinai and the German Hospitals, New York.

WEEPING SINEW.

GENTLEMEN,—The patient, a young man, states that after doing some unusual work two weeks ago he noticed the appearance of a painful swelling on the dorsum of the forearm, interfering with the use of the hand.

We see, corresponding to the course of the abductor and extensors of the thumb, an oblong semi-cylindrical swelling. The skin over it is œdematous and reddened. On deep palpation we observe fluctuation. On movement of the thumb a peculiar soft crepitus, comparable to the rubbing together of leather, can be felt.

The diagnosis is a teno-synovitis crepitans, an affection due to unusual efforts of the hand and forearm, as, for instance, in rowing (with feathering) or using a gimlet.

Its pathological substratum is an inflammation of the synovial sheaths of certain tendons. The extensors are most commonly affected, but any one of the synovial sheaths can become the seat of the trouble.

On inspection the synovial membrane is found to be injected, the connective tissue surrounding the sheaths thickened and infiltrated, the synovial sac itself containing a moderate or copious exudation of more or less viscid character. From this exudation deposits of fibrin take place, which deprive both sinew and synovial membrane of their smooth character, and to this circumstance is due the crepitus.

Whenever the affection—always of a traumatic origin—appears in a subject of sound health, its course is brief and ends in resolution, absorption, and re-establishment of function. But where the system is burdened with constitutional taint, such as syphilis, tuberculosis, or

a rheumatoid disposition, the disorder is tardy in disappearing, and is apt to recur at brief intervals until a chronic disability is established.

In these cases the traumatism only serves to create a place of predilection, in which the specific poison finds a congenial pabulum for its development.

The most common of the chronic affections of the synovial sheaths is the tuberculous. The morbid changes observed here are similar to those found in synovial tuberculosis of joints.

A very fine pannus-like coating of delicate granulations is found to line the interior of the sheath. Upon these granulations fibrinous deposits settle, derived either from the exudate or from capillary hemorrhages. The effects of the roughness thus engendered cannot be overcome by the lubricant action of the synovia, and thus by continuous friction the fibres of the tendon are worn away, this process ending in what is called *spontaneous rupture* of the tendon. The retracted stumps of the tendon present a frayed appearance comparable to a camel's-hair brush. In this form of synovial tuberculosis we see occasionally a mechanical breaking up of the fibrinous deposit into a number of small oryzoid bodies, thus called on account of their external resemblance to rice-kernels.

This is one form of tuberculous teno-synovitis.

Another form, called teno-synovitis proliferans, presents somewhat different characters. We observe here the growth of extensive and ramifying masses of gelatinous structure from the pannus mentioned above, which, following the course of the sheath, gradually fill up the interior of all adjoining sheaths.

In these cases the tumor becomes permanent, and its size variable, dependent upon the fluctuating amount of the effusion.

Both of these tuberculous forms of teno-synovitis represent a grave deterioration of the functional power of the hand, ending usually in permanent disability.

Though we sometimes observe an improvement and even cure of these states, by treatment with rest, pressure, and massage, this issue is unusual.

But it would be yielding too much to the tendency of the day to ascribe all the forms of chronic teno-synovitis to tuberculosis. A considerable proportion of cases is clearly of a rheumatic, more especially gonorrhœal, character. It seems pretty certain that the essential cause of rheumatism is the absorption of pyogenic elements from one or another place afflicted with an open sore or muco-purulent discharge.

Rheumatic effusions and the lesions found on the endocardium and

the intima are regularly associated with the presence of one or another form of pyogenic organism.

It is therefore essential in all cases of acute or chronic teno-synovitis to exclude by careful examination the presence of a gonorrhoeal taint. The practical importance of this caution will be appreciated by considering the influence of the diagnosis upon the prognosis, and the necessary treatment of the causal condition of the urethra.

By drawing one more state within the limits of our study we shall have exhausted the various forms of teno-synovitis. *Syphilis* is known to cause occasionally gummy deposits and ulceration of the synovial sheaths, the recognition of which is an essential condition of their successful treatment.

What is the lesson to be drawn from these considerations? It is that whenever you take charge of a case of articular or tendinous synovitis you should not fail to make a careful inquiry into the concomitant symptoms which might elucidate the specific character of the affection.

Let us examine this patient. What is the condition of his lungs? Physical examination reveals a normal state. Examination of the urethra fails to show the presence of purulent discharge. The skin, the throat, the glandular and osseous systems bear no evidence of the presence of syphilitic taint. The statements of the patient himself should receive credence only so far as they are not contradicted by the evidence of an exact physical examination.

We can, therefore, declare this case, with some degree of probability, to be one of simple traumatic teno-synovitis.

Its treatment will consist in the securing of rest to the forearm and hand within a sling, and the application of an ice-bag wrapped in flannel over the painful swelling, to be used until its disappearance. The functional disability remaining behind will be successfully combated by gentle friction, hot baths, and methodical exercises.

A more incisive treatment will be necessary in tuberculous teno-synovitis, as the preceding treatment will usually prove ineffectual.

Of course the general condition of the patient will require proper hygienic attention. The local affection must be attacked with the knife. In the oryzoid form all the fibrinous deposits and rice-like bodies must be removed after slitting open the entire extent of the involved sheath. In the proliferating variety the entirety of the gelatinous excrescences must be removed by careful and thorough dissection. In both cases the first condition of success lies in the complete exposure of the seats of the trouble. The carpal ligaments need not be respected, as their integrity will be restored by healing.

The operation is done with the aid of artificial anæmia, and can be very perfect. After removal of all diseased matter, the synovial sheaths, as far as they could be preserved, and the outer skin are brought together with catgut stitches, the number of which should be limited, leaving slight gaps for the escape of the first secretions, thus obviating the necessity of formal drainage. A moderately compressive antiseptic dressing of the Schede type (protective next the wound) completes the procedure.

The patients should be directed to make minute active motions of flexion and extension with their fingers, in order to fashion in the internal blood-clot filling the wound a sort of pattern for the formation of the new tendon-sheath. If this is neglected the tendons become attached to the surrounding connective tissue, ankylotic, and useless.

Within a fortnight or three weeks, provided no suppuration follows, the cure is accomplished. I have repeatedly had occasion to observe that the ultimate result, so far as the function is concerned, is excellent. An illustrative case, that of a physician, is reported *in extenso* on page 302 of my Surgery.

The gonorrhœal form of teno-synovitis is characterized by intense rebelliousness to topical treatment, and a pronounced and early tendency to the formation of extensive and permanent adhesions, resulting in tendineal ankylosis. The effusion, as a rule, contains considerable quantities of purulent material. In some cases a slight turbidity is all that will raise the suspicion of the surgeon. In other cases the effusion is distinctly pus. In proportion to the quantity of purulent elements the gravity of the affection appears to be lesser or greater. Should the standard treatment by fixation, the internal administration of salicylates and iron, combined with due attention to the urethra, not yield a marked beneficial result within a reasonable time,—say two to three weeks,—and especially if probatory puncture gave evidence of the presence of pus, an adequate incision and evacuation of the noxious effusion would be appropriate.

The syphilitic, or gummatous, lesions of the tendinous sheaths are, fortunately, very rare. Their development is insidious, and, if not checked, will lead to extensive destruction of the concerned organs.

Before the time when coagulation-necrosis of the central part of the gumma takes place, a generous exhibition of iodide of potassium will ordinarily bring about a marked improvement, and even cure, of the local trouble. When, however, necrosis is once established, the issue becomes more doubtful. Surgical interference should not

disturb the local process as long as no perforation and communication with the outer air is imminent or established. Should this occur, an occlusive antiseptic dressing or, if purulent infection has undoubtedly complicated the process, a free incision and open treatment under moist dressings of corrosive-sublimated gauze would be proper. Here, as well as in the former case, the institution of systemic treatment is an indispensable condition to success.

CHRONIC PYELONEPHRITIS OF THE LEFT SIDE.

The patient, a middle-aged man, of slight physique and poor nutrition, had eighteen months ago an external urethrotomy performed, by one of my colleagues at Mount Sinai Hospital, for very tight stricture of the deep urethra. The urine had a tendency to return to an alkaline condition, and this retarded the prompt healing of the external wound, and finally led to the formation of a lip-shaped fistulous aperture.

A number of ineffectual attempts were made to bring about closure, by the application of chemical and caloric caustics. Thus the external orifice of the fistula closed, but retention soon showed the worthless character of this healing. A number of successive incisions had to be made until, when the patient came under my charge, his perineum appeared to be riddled by four sinuses. Slitting these up and scraping them and excising the cicatricial matter finally reduced the condition so as to leave behind only two openings, both occupying the raphé at a distance of an inch from each other. I then undertook the closure of these fistulæ at one stroke by Szymanowski's plastic operation, with which I had achieved invariably good results in eight preceding cases of urethral fistula. But in this case I had undertaken too much. The poor nutrition of the tissues together with the alkaline urine frustrated primary healing. A new labyrinth formed, which by extensive incisions was again reduced to the simple condition of a rather irregular conical pit, its apex opening into the urethra and its base on the external surface. By carefully packing this cavity from the bottom, and the occasional use of the sharp spoon and actual cautery, it finally, after eight or nine months' treatment, became permanently closed, and here you see the result.

He was discharged from the hospital about six weeks ago apparently well. He now returns, complaining that shortly after his discharge a severe chill, accompanied by excessive pain in the left loin, vomiting, and general illness set in. On palpation an indistinct and apparently very tender mass occupying the left loin can be made out. On sharp pressure the pain is felt to extend into the testicle and thigh

of the same side. The abdominal parietes are markedly rigid over the intumescence; hence its outlines cannot be as clearly made out as would be the case were the patient anæsthetized.

The specimen of fresh urine produced contains pus, large quantities of mucus and granular casts, is slightly acid, and loaded with bacteria. Within the last four weeks three such attacks were observed. The amount of urine was markedly reduced during the attack. With the alleviation of the symptoms copious evacuation of urine heavily loaded with pus and mucus took place.

It seems plain that we have here to deal with a case of pyelonephritis of the left side, complicated with some periodical impediment to the discharge of the renal secretions into the bladder. Whether this obstruction is due to a stricture or a solid impacted body, or to both, we are unable to decide now.

As to the causation, it is probable that the course of the purulent infection was from the bladder to the left kidney.

In considering the therapy of this condition, we have first to decide beyond doubt that the pelvis of the kidney is the seat of periodical retention. The aspirating-needle used during an exacerbation will decide this point.

Our patient's stricture has been cut, and has not returned. Were this not so, attention to this or any other causal factor would be essential.

In former days attention to the removable causes of surgical pyelonephritis and internal medication of a very questionable value exhausted the sum of available therapy. Nowadays modern surgery has opened a new, direct path to the treatment of the affections of the kidney. Incision, evacuation, temporary or permanent drainage, the removal of calculi, finally, the excision of the entire organ, represent the more or less incisive means for alleviating or curing renal affections.

In this case, then, we shall puncture. Should puncture yield pus or purulent urine, nephrotomy and drainage of the pelvis of the kidney will be in order. Should the incision prove that the organ is nearly or entirely destroyed, or that the corresponding ureter is permanently closed, an extirpation of the kidney would come in question. This, however, could be done only on condition that the other kidney were present and performing its function.

Before parting I shall say a few words about another case of renal malady which came before us at Mount Sinai Hospital a week ago. It was that of a middle-aged woman suffering from constant hæmaturia for six weeks. Colicky pains in the left loin were complained of,

where also pressure caused pain. The kidney was not perceptibly enlarged. A cystoscopic examination showed that the seat of the hemorrhage was extra-vesical. Renal calculus was suspected to be present. Hence, as the hemorrhage began to weaken the patient, the kidney was exposed by an oblique lumbar incision. It was isolated from its external capsule, found normal in shape and size, and careful palpation, as well as a series of punctures arranged in the shape of a fan and fourteen in number, failed to show the presence of a stone. However, near the convex border of the middle portion of the organ a pitting and fluctuating area was found to contain a cavity filled with grumous blood. As we had failed to establish the presence of a gross lesion of the kidney, we decided not to proceed further. The diagnosis was so far established as to exclude the presence of a large calculus or a noticeable collection of pus. A small calculus or an incipient malignant growth were still to be thought of. The wound was closed, and appears now to be healing by first intention.

But now comes the strangest part of our experience. I mentioned that her urine was constantly bloody before the operation. Since the second day after operation every trace of blood has disappeared, the colicky pains also.

It seems, then, probable that the cause of the disturbance was, after all, a small calculus, which was possibly expelled by the manipulations that accompanied our operation. Whether or not this assumption is true, time will show.

A PLEA FOR RAPID DILATATION; HOLT'S OPERATION IN THE TREATMENT OF URETHRAL STRICTURES.

CLINICAL ARTICLE WRITTEN EXPRESSLY FOR THE INTERNATIONAL CLINIC.

BY F. R. STURGIS, M.D.,

Surgeon to Charity Hospital, Blackwell's Island, New York City.

So much interest has for some time been taken with regard to the internal methods of treating urethral strictures in the male, and so many able arguments have been adduced for the method by urethrotomy, that it would seem almost superfluous in me to add to the many papers on this subject, were it not for the fact that amidst all that has been written and said, one method of treatment, which presents many points of advantage over internal section, has been overlooked. I mean the one that is known as rapid dilatation or divulsion performed by Holt's instrument.

INSTRUMENT.

The instrument is a perfectly simple one, and, as originally devised by Mr. Holt, consists of two thin, narrow blades (*A, A*), capable of

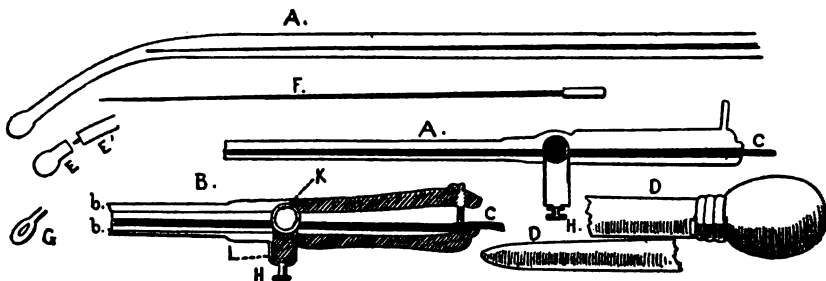


DIAGRAM OF HOLT'S INSTRUMENT.—*A, A*, instrument, with closed blades; *B*, butt of same, opened, showing, *C, C*, wire on which, *D, D*, wedge runs (only tip, and butt are shown); *E*, cap unscrewed from instrument; *F*, bougie which screws on to *E*; *G*, cap showing groove on which whalebone bougie runs; *H*, screw for separating and uniting blades *b, b*; *K*, screw which releases yoke, *L*, for cleaning instrument.

separation to within a short distance of the head, in the centre of which is a wire (*C*), which acts as a traveller for certain hollow

metallic rods which separate the blades and act as a wedge (*D*). This instrument has been further developed (by the late Dr. Bumstead) in the following manner: The apex, which in the English instrument is firmly attached to the rest of the instrument, is made in the American instrument to unscrew (*E*) for the purpose of attaching filiform, elastic, gum bougies or guides (*F*), and in addition to this the bulbous point of the instrument is also perforated (*G*) to admit of its running over the whalebone bougies of Gouley when they are passed through a tight stricture. The object of this is quite apparent, inasmuch as if a stricture be very tight, or if false passages exist, the use of the filiform bougies prevents the instrument from engaging in the sinuses of the false passages or from itself making false passages. The mechanism is perfectly simple, and the instrument when closed is so slender that it will pass everything except the very tightest variety of stricture. If the stricture be only moderately tight, the instrument may be passed in at once without the assistance of the filiform guides, but if it be very tight, or there be any suspicion of the existence of false passages, then the filiform guides are passed and the instrument is either attached by a screw to the gum-elastic bougie or passed directly over the whalebone one by the tunnelled opening which exists at the top. Thus the instrument can go in no direction but that taken by the filiform bougie, which presumably has entered the bladder. The dilator once well placed in the bladder, the upper screw (*H*) is loosened as far as it will go. The hollow metallic rod (*D*) is placed on the traveller (*C*), and the instrument is then pushed well home with a sudden, quick movement. When momentary resistance is felt as it passes through the strictured part, it is evidence that the constricted portion is giving way, as it readily does under the force of the hand.

These tunnelled rods vary in size from a No. 26 to No. 35 French, the diameters being taken with the rod *in situ* between the blades, so that the urethra is divulsed up to these numbers, although the size of the instrument when closed is only that of No. 14 French. These rods are not circular in shape, but elliptical (*D,D*), consequently, in making the divulsion it is well, after the instrument has been passed, to change the direction of the axis of the rods from vertical to horizontal, making the divulsion in both diameters of the urethra. Under these circumstances the operation is much more complete. In withdrawing the instrument it is well to take it out altogether, so as to avoid pinching up the urethral mucous membrane and, perhaps, taking out a strip, which, even with the best of care, sometimes occurs. Even if it does, it is not a matter of much consequence.

The operation is not a very painful one, and may be done without etherization, though I should much prefer the patient to be unconscious in order that the natural contraction and resistance of the muscular fibres of the urethra may be overcome. This resistance, of course, increases the force requisite to pass the rod between the blades of the instrument.

ADVANTAGES OF THE OPERATION.

I may be asked what particular advantages divulsion presents over the other methods of internal urethral operation, and in answer I would say that there are three: *First*, avoidance of severe hemorrhage. *Second*, avoidance of severe chills. *Third*, less danger of septicæmic poisoning.

As Regards the Question of Hemorrhage.—In all the arguments advanced for internal urethrotomy, able as the exponents of this method of operation are, we cannot fail to be impressed with the numerous cases recorded of severe hemorrhage after the operation, especially if the stricture be seated in the deeper portions of the urethra. Many of these hemorrhages are severe, not a few of them alarming, some of them fatal. I have myself had unfortunate experiences with internal urethrotomy, which led me first to use Holt's instrument in preference to either the knife of Maisonneuve or the excellent instrument of Otis. It has been my good fortune, since using the method of divulsion, not to have had any cases of severe or alarming hemorrhage. No bleeding has ever occurred within my experience which was not readily controlled by the application of cold or, in the very worst cases, by styptic injections. In the large majority of cases the hemorrhage takes care of itself and stops in a very short time. I have never with this method met with the copious hemorrhages externally or the filling up of the bladder with clots of blood, which have been observed in cases of internal urethrotomy, and that, too, even when the strictures were seated in the deeper portion of the canal,—that is to say, more than four inches from the meatus.

Absence of Chills.—After the patient recovers from the effect of the ether there is some pain and uneasiness complained of in the urethra, and shortly after he comes entirely to his senses a desire to evacuate the bladder is felt. This I generally permit him to do so soon as the desire is felt, and only in very rare instances does it happen that any chill follows the first micturition. Even when it does the chill is very slight, lasting but a few minutes, and not putting the patient to any great inconvenience. This is seldom repeated, and, in fact, from that

time on, and even after the first passage of sounds, the chances of the patient being troubled with chills are very slight indeed.

In the early days of employing the instrument I used to give the patient, immediately after coming out of the ether, a powder of nine grains of quinine with one grain of opium, either dry upon the tongue or in capsule. This was used to prevent the occurrence of a chill; but, latterly, I frequently omit even this, and yet it has seldom happened to me to meet with any severe chill on the patient's first voiding urine after the operation. Allow me to say that in none of my cases do I leave an instrument in the urethra. I think it unnecessary, in the first place, and, in the second, I believe that it is provocative of chill and urethral disturbances.

As Regards Septicæmia.—I have never seen an instance of septicæmia after the use of Holt's divulsor. In the many cases operated upon by me (amounting now to perhaps several hundred), I have had but two cases of fatal termination, and both of these were from causes separate from the operation and not due to it in any degree. I shall speak of these in a few minutes. In no case of rapid divulsion has it been my ill fortune to see death from septicæmia.

Besides the use of this dilator for rupturing strictures, Mr. Holt, in his little monograph, "The Immediate Treatment of Stricture of the Urethra," says that he considers it equally efficacious where gradual dilatation is desired, and considers that it possesses an advantage over every kind of bougie or sound in its power of dilating a stricture to any extent without being withdrawn. I have myself never used the instrument in this manner, and have always preferred, if I had to use it, to rupture the stricture and have done with it once for all. Still, I can readily conceive how it might be of advantage in cases where gradual dilatation was required. In such instances I have nearly always used sounds.

CONTRA-INDICATIONS.

Thus far it would seem as though this operation were one that was simple and absolutely devoid of danger; but to pass such a hasty judgment as that at once upon it would perhaps be rash. I suppose, undoubtedly, the operation might prove dangerous if certain rules were not observed to guide us in the selection of this in preference to other modes of operation; and it is to this question of contra-indication that I ask your attention for a few moments. When I first began to perform the operation I did it on all the strictures which I encountered, no matter where they were situated in the urethra, whether near the

opening or far down. In all of these the results seemed to be pretty evenly good, and certainly, if I had to do an internal operation upon a deep-seated stricture I should unquestionably give the preference to divulsion rather than to any other method. Indeed, with my present belief, I should absolutely decline to do any internal cutting further than four inches from the meatus, and that would be the outside limit. With a Holt's instrument I should feel safer in operating even if the stricture were five or five and a half inches down in the canal, where the cutting method would be the most dangerous and attended with most risk. But even with this instrument I should decline internal operation of any kind if the stricture were very tight, either from the spasmodic, irritable contraction of the canal, or from the presence of an organic or cretaceous stricture, since this would necessitate a great amount of force in order to carry the rod along the traveller between the blades and produce the wedge-like action, and would necessarily do violence to the surrounding parts and perhaps produce periurethral abscesses. I base this statement upon one or two instances in which I thought periurethral abscesses occurred after an operation of this kind.

Another contra-indication to the use of this method, indeed to any method of internal urethral operation, would be the existence of evidences of renal disease, even if these only amounted to the presence of a slight amount of albumin in the urine. Under these circumstances the shock, no matter how simple the operation (*e.g.*, even simple catheterization), has sometimes produced suppression of urine and uræmic poisoning. In such a condition of affairs I should never think of performing any internal urethral operation. If operative procedure were necessary it should always be external section. I remember that one of my fatal cases occurred in just such an instance as this, where, from a misunderstanding, the condition of the patient's urine was not reported to me before the operation had been performed. The man stood the operation exceedingly well, and had no hemorrhage or chill until the third day after the operation, when he suddenly suffered suppression of urine, became comatose, and died. The autopsy revealed a degenerative condition of the kidneys, and, on inquiring about the case, I afterwards found that the urine had been examined, as I always insist upon in these cases. It had a low specific gravity, with albumin and casts. Unfortunately, I was not in possession of these facts before the operation, else I should never have adopted the internal method. The condition of the urethra was an interesting one, and that I shall speak of in a few moments.

Another contra-indication to this method of procedure would be

any tight, deep urethral strictures where there was a very irritable condition of the canal. Especially would this be true in those cases where there was a predisposition to chill after the slightest instrumental examination of the urethra; and, more important than all, the operation would be contra-indicated in any case where there was also the slightest reason to suspect a renal inflammation of any kind whatever. Under these circumstances external operation is the only admissible one, if any must be done; and, strangely enough, although it would seem the most serious operation, it is really, in my experience, the safest of all. Next to this in safety comes rapid divulsion.

PATHOLOGY OF THE URETHRA AFTER THE OPERATION.

Mr. Holt at first believed that by the use of his dilator only the seat of the obstruction was split,—that is, as I understand it, only the fibrous material which formed the stricture, while the urethra itself was not injured. But in an appendix to his work he makes the statement, “Since the foregoing pages were written I have had an opportunity of ascertaining what is the exact condition of the urethra after death when the stricture has been split. A man was admitted to my ward in the Westminster Hospital in October, 1871. He had been the subject of stricture for eighteen years, and for the last twelve years the bladder had been relieved with increasing difficulty, and he could only pass his water in drops. I endeavored to introduce a No. 1 catheter, but found the impediment too contracted to admit even that size, and he was sent to bed, with directions to take castor-oil and remain quiet for a few days. In the mean time he was attacked with fever, and died on Sunday, November 10. The friends objecting to a general post-mortem examination, I ultimately succeeded in persuading them to permit the urethra to be examined, which I was exceedingly anxious to do, for the purpose of ascertaining what was the precise effect produced by the passage of the dilator and its large tube. With some difficulty I introduced the dilator through two strictures, one within four inches of the meatus and the other at the bulb, both apparently half an inch long. The sensation was like what I have frequently experienced during life, and the dilator having fairly reached the bladder, I passed a No. 12 tube, split the strictures, and, before withdrawing it, rotated the dilator in the manner already described. My friend, Mr. Heath, now removed the penis, with a portion of the bladder and rectum, and, having laid open the urethra, the two strictures as seen in the drawing were found to be split at the under portion of the canal, the rent being directly in the median line and limited to the extent of the obstruction.

The contiguous strictures were uninjured, and the divided mucous membrane gaped to an extent sufficient to permit the passage of a large bougie."

This experience coincides also with my own, where in one of my fatal cases I had the opportunity of observing the result of the operation. It was in the case of which I have already spoken, in which there was renal disease complicating the stricture. There were two strictures, one at three and three-eighths inches, and the other at seven inches from the meatus. The seat of the strictures could be readily detected on post-mortem examination, and the division, which was a linear one, extended directly through the mucous membrane and the fibrous tissues composing the strictures for the entire extent of both, one of which, the anterior one, was a quarter of an inch in length.

From these two cases, I think, it can be concluded without any doubt, that in this operation the mucous membrane is ruptured by the operation, and not alone the fibrous tissues composing the stricture.

CONDITION AFTER OPERATION.

After the operation, as I have said, it is very seldom indeed that a chill takes place, and I have never seen a case of septicæmia follow. I am not prepared to give any explanation as to why this should be, but I have repeatedly noticed that a clean cut in the urethra is much more frequently followed by chills and fever than a contused wound, such as would be produced by divulsion. The patient usually recovers from the ether, and the first act of micturition, although painful, is attended by very little bleeding, sometimes by none, and very seldom by a chill, even if no quinine and opium be administered. Of course, no operation for the relief of urethral stricture is complete without a longer or shorter period of after-treatment, and this consists in the passage of sounds for a length of time varying according to the tightness of the strictures, the irritability of the urethra, and the general condition of the patient. My habit usually is, unless some contra-indication presents, to commence the passage of the sound on the third day after the operation, and I usually select a size below that at which the stricture was ruptured. Not infrequently after the operation, the surgeon may perhaps be disgusted to find, if he attempt to pass an instrument of the same size as that at which the divulsion was made, that the instrument is prevented by a spasmodic closure of the urethra. This is really not a bad symptom, nor an indication that the canal has not been properly opened. It is fair to suppose that a contused wound, such as would be produced by the operation, would naturally be irrita-

ble upon the first introduction of any instrument, but this irritability very shortly passes off, oftentimes at the first passage of the sound, especially if a size be passed smaller than the normal calibre of the urethra. The first instrument going through the stricture is withdrawn and the second one of the full size of the canal is passed, but no instrument is ever left *in situ*. They are all withdrawn, almost immediately after the introduction; and even after the first passage of the sounds, a period so dangerous in the operation of internal urethrotomy, chill or hemorrhage seldom takes place. If either or both be present, they are trivial in character and very readily controlled. The instruments are passed for the first few times every third day, then every week, then every ten days, and lastly every fortnight, after which time I generally advise the patient, for the first year after his operation, to have the sound passed every month or six weeks. Of course, in this particular the surgeon must exercise his own discretion, and in cases where the stricture has been slight, and the result of the operation good, the passage of the sound may perhaps be delayed to once every two or three months at the outside. During the second year I always advise the patient, if within reach, to present himself to me for the passage of an instrument once in every six months.

Until after the passage of the first sound I keep the patient in bed. If after that time no chill or hemorrhage has occurred, and everything goes on well, I tell him he may get up at the end of four or five days; but if the progress be not satisfactory, I keep him in bed until after the second passage of the sound,—that is, at the end of the sixth day; and it is very seldom, indeed, that I have to keep a patient in bed after the first week.

RESULTS OF THE OPERATION.

In my experience the results of the operation have certainly been more favorable by the method of divulsion than by that of section, and I believe that fewer relapses take place, provided only the patient is careful to continue after-treatment, and to recognize the importance of having the sound passed as frequently as I have suggested in the previous paragraphs. Care and attention in this respect are, I believe, important in all methods of internal urethral operations,—certainly, no less so in the method of divulsion; but even here I think the chances of a return of the stricture are less than when they are simply cut through. I have seen many cases several years after the operation has been done, and where sounds had not been passed with any great degree of regularity after the first six or nine months succeeding the

operation, but in all these cases I have been surprised and gratified to see how easily a sound of the largest size would pass, and only exceptionally has it been that I found a tendency towards recontraction. In those cases the occasional passage of a sound has removed all difficulty and allowed the largest-sized sound to pass into the canal without difficulty.

I believe I have brought out the salient points in favor of this method of operation.

First, its comparative freedom from danger ; second, the possibility of its performance, even under unpromising circumstances ; third, the good results which follow the method by divulsion.

I should be very glad, indeed, if this method should obtain wider attention and use in the future than it seems to have done in the past.

Gynecology and Obstetrics.

OVARIAN AND TUBAL DISEASE CAUSING UTERINE HEMORRHAGE AND PAIN; LAPAROTOMY; CURE.

CLINICAL LECTURE DELIVERED AT THE GOOD SAMARITAN HOSPITAL, CINCINNATI.

BY THAD. A. REAMY, M.D.,

Professor of Clinical Gynecology in the Medical College of Ohio, Gynecologist to the Good Samaritan and Cincinnati Hospitals.

GENTLEMEN,—The patient before you was introduced at my last lecture before the Christmas holidays. It was then decided that the only proper treatment for her relief was the removal of the uterine appendages. She then left us promising to return at this date. She has kept her promise, we must now fulfil ours; so when she has been etherized we shall proceed with the operation. But as we have plenty of time at our command, we will, in order to refresh your memories and bring the case intelligently before you, hear the history then obtained.

Mrs. A., aged twenty-eight years, is a widow, mother of two children, of whom the older is eight, the last, born four years ago, died in infancy. She is a nurse by profession, has suffered during the past seven years, except when pregnant, from menorrhagia. Not only has the menstrual flow been profuse, but the periods have generally been prolonged to ten or fourteen days. She has on several occasions gone ten to twelve weeks without flow; she has also had at times intermenstrual hemorrhage, though this was not profuse. Menstruation is painful. She has for many years suffered much from pain in the ovarian region, on both the right and left side. She has a profuse leucorrhœa.

She is thin, of flabby muscle, badly nourished. The facial expression of suffering is well marked. She is a confirmed invalid. A physical examination discloses the fact that the vaginal walls are tender

to touch and the uterine cervix somewhat enlarged. There has been slight laceration of the cervix. There is not much ectropion, but the os is patulous. The uterus is anteverted and enlarged. There is apparent thickening, as if from a fibroid tumor, of the anterior wall at the fundus. This symptom is, however, uncertain and often deceptive when, as in this case, anteversion exists.

To the right of the uterus, and in tolerably close relation with it, is a fluctuating body apparently as large as a turkey's egg. This body is slightly movable and is tender on pressure. I take it to be a cystic ovary. Extending farther outward, but continuous with it, is felt what I take to be a distended Fallopian tube. On the left side the same conditions are recognized, but the enlargement is not by any means so great, nor is pain on pressure quite so well marked.

We have here, therefore, cystic degeneration of one or both ovaries, with probably right salpingitis, and possibly hydro-salpinx. It is possible, also, that there may be a small fibroid tumor in the anterior uterine wall, which contributes to the uterine hemorrhage from which this patient suffers; but, as before stated, the existence of such a tumor is by no means clear, and if I am correct as to the condition of the ovaries and Fallopian tubes, the presence of a uterine tumor is not needed to account for the hemorrhage.

The clinical test as to diagnosis in such a case is an exploratory incision, which, as the patient is now well anæsthetized, we at once proceed to make. [Operation performed.]

The operation, as you will testify, was easily and quickly done, only about twenty minutes from beginning to finish, and most of this time was consumed in the toilet of the abdomen, including suturing and bandaging.

There were no adhesions to occupy our time, and no bleeding of moment to cause difficulty in drying the peritoneal cavity, or delay in closing it.

Permit me, now that the patient is sent to her room, to call your attention to the specimens removed and, very briefly, their probable relation to the symptoms which the patient presented,—after which I shall make brief comment upon some of the methods of the operation and the proposed after-treatment. Both ovaries and both tubes were removed. As the specimens are passed around for inspection, please note that the right ovary, which was when removed not quite so large as a turkey's egg, is cystic, showing one large cyst and many smaller ones. The larger cyst from appearances may be a hæmatoma. This will be determined on opening it. The entire ovary is so soft that I

doubt whether much ovarian stroma is left. Of course these questions must be more definitely settled by careful examination hereafter. The corresponding tube is greatly distended and lengthened. It is bent upon itself near the fimbriated extremity and closed by adhesions. It contained, when opened, a considerable quantity of serum. Opening the larger cyst in this ovary, it is found to contain dark fluid blood and serum. Near the hilum of the ovary, in the edge of that portion of the broad ligament which was removed and is attached to the tube, as you will notice in the specimen, is a well-formed cyst, with moderately thick walls, about three-fourths of an inch in diameter. This is unquestionably the commencement of an intra-ligamentous cyst. It is rare that we have the opportunity of inspecting a cyst of this character at such an early period in its development. You will therefore be interested in examining it. You have already been informed that these intra-ligamentous cysts are developed from foetal remnants. Hanging from the fimbriæ of the tube from the left side, you notice two or three small, smooth, round cysts, presenting the appearance of "air-bladders." These are the so-called vesicles of Morgagni, and are simply distended lymph-vesicles. They have no pathological significance whatever. The left tube is enlarged, its lining membrane congested, but it is patulous. The left ovary is unusually soft, and on section is found to abound in dilated ovisacs, so-called retention-cysts. Of course these specimens can now only be examined macroscopically, and their gross appearances noted. In the future we must profit by learning their microscopic appearances, and trace back, if possible, from present conditions to the primary disease, which we suppose was inflammatory in character.

If you will hold the specimens up and so unfold them as to get transmitted light, you will discover that the vessels of the parovarium are unusually large and abundant, and many of the veins quite tortuous.

The uterus was found enlarged and anteverted, but I was not able to detect any tumor in its anterior wall, as suspected before operation. It is gratifying that our operation has at least so far confirmed our diagnosis as to warrant its performance, and to justify the hope that it may result in the patient's cure.

This woman was as thoroughly unsexed by the existing disease as she is now that the appendages are removed. Almost every other known plan of treatment had been resorted to without avail. It is now clear that no measure less radical could have cured her. All adverse criticism is therefore silenced.

Similar cases in which uterine hemorrhage and pain were associated

with, and probably dependent upon, cystic, ovarian, and tubal disease have been reported by McMordie, of Ireland, Tait, of England, and Maury, of Memphis. I have myself met with three cases previous to the one before you to-day.

Uterine hemorrhage caused by uterine tumors, and the removal of the appendages for the arrest of hemorrhage and for arrest of the growth of such tumors, are now every-day occurrences; but this case is quite different and, so far as I know, much more rare.

A word as to a few points in connection with the operation.

First we shall speak of the cleansing of the peritoneal cavity and of drainage. You will observe that I did not in this case do as I have in some other cases in your presence,—viz., flush the abdominal cavity with warm water. Nor did I introduce a drainage-tube. Note my reasons for these omissions. As there were no adhesions broken down during the operation, no pus cavities opened, and no colloid or other irritating material discharged into the peritoneal cavity, it was not necessary to flush the cavity, either for the arrest of hemorrhage, or for the removal of blood-clots or other irritating substances.

A soft sponge, of small size, wrung out of warm water, was quickly but gently passed to the bottom of Douglas's pouch, thus easily cleansing the cavity and leaving it dry. This, as you observe, was a saving of time, an important element in all operations which involve opening the peritoneal cavity. But time thus saved would have been time lost if, on the one hand, blood-oozing had been going on into the peritoneal cavity, or, on the other hand, colloid, pus, or other irritating or infecting material had come in contact with the peritoneum. Under such circumstances free flushing is essential to good results. Some experienced operators flush the peritoneal cavity in all cases, as a matter of routine. They object to the use of sponges in the cavity, alleging that such agents necessarily break and wound the peritoneum, increasing the bleeding, and causing inflammation.

All this can be avoided by the manner of using the sponge. To facilitate the manipulation, as you saw me do it, two fingers of one hand are passed down behind the uterus, while two other fingers of the same hand hold back the small intestines (which at this time are prone to glide down just where you do not want them); thus you have a free route into Douglas's pouch, through which the sponge, held by a secure holder or forceps, can be quickly passed, without damage to the peritoneum.

But why was no drainage-tube inserted in this case? I answer by asking, Why should we insert a drainage-tube in such a case? Before

proceeding to find answers to these questions, please recall my oft-repeated declaration that, in abdominal surgery, no routine practice can be safe or scientific. Each case is a law unto itself. Nothing is to be done without good and sufficient reasons; and, *per contra*, nothing should be omitted except under the same special law.

The conditions which rendered the flushing of the peritoneal cavity unnecessary in this case make up the chief reasons why the drainage-tube was unnecessary. There will be little or no hemorrhage to arrest or to dispose of by the drainage-tube. No septic material was found or introduced during the operation of such quality or in sufficient quantity as to cause peritonitis or suppuration; therefore the drainage-tube could be of no utility. On the contrary, it would be a source of inconvenience and possibly of positive danger to the patient, and a cause of anxiety and solicitude to the physician. To be more specific, I will name some of the objections to the drainage-tube. The glass tube with perforations in its lower third is preferable, in which the openings should not be too large, as they may admit knuckles of intestine or omentum. Even with proper precautions in this regard there is still a tendency in many cases for the intestine to press against the tube openings, and this is increased by any process of emptying the tube. Thus the tendency for the bowel to be fastened in the lymph around the tube is increased. I am certain that some cases of obstruction have this origin. As the tube should be frequently emptied, this disturbance of the intestine is often kept up.

The method of emptying the drainage-tube by passing to its bottom pledgets of cotton by means of a slender forceps is perhaps preferable, but not without its objections also, as the peritoneal covering of the small intestine, which presents at the openings of the tube, may be irritated, and, as the contents of the tube are more or less exposed to air during the process of emptying, and will be brought in contact with the irritated intestinal peritoneum, there is at once established a possible source of peritonitis. But you have been taught that within a few hours after the abdomen has been closed the track of the drainage-tube is shut off from the general peritoneal cavity by organized lymph. So it is, generally, and your attention was just called to the danger that, under such circumstances, the bowel may become fixed, forming intestinal adhesions.

Another danger from the drainage-tube arises from the fact that it must rest on the peritoneum at the bottom of the pelvis, causing, in some cases, inflammation and pain. This may to some extent be avoided by frequently raising the tube a little and rotating it, but still

the danger is not entirely removed. In some instances a loop of intestine glides under the lower end of the tube soon after its insertion, or the tube may change its position, and we may sometimes have a fecal fistula thus produced. I am satisfied that this relation of the bowel to the tube is in many instances a source of pain, even though nothing more serious may follow.

Another objection to the drainage-tube is that it prevents union of the abdominal wall by first intention at the point of its insertion. This objection has not so much force when it is left in only a short time, but it sometimes occurs when the tube remains but twenty-four hours, the abdominal walls becoming so infected that more or less suppuration must occur. Thus we have an element of delay in recovery, but, still worse, there is always, under such conditions, danger of ventral hernia following. This is an accident of serious import.

Thus you see that the drainage-tube is not an agent for good alone. Though it is, as we shall see, in some cases indispensable, nevertheless, its use is attended with so many objections and fraught with so many dangers that it is my custom to dispense with it whenever I can consistently do so. I would employ it in most cases where the patient operated on is over fifty years of age. In such subjects capillary oozing into the peritoneal cavity occurs after abdominal section much more freely and lasts longer, while the capacity of the peritoneum for disposing of the blood and serum discharged into it is greatly less than in younger subjects. Hence the importance of more direct and thorough drainage. Even in young subjects, where extensive and vascular adhesions have been broken up so that considerable hemorrhage must occur after the abdomen is closed, the tube should be employed; also after operations for ectopic gestation where rupture has occurred and old clots are found, and after laparotomy in cases of tubercular peritonitis.

In these cases the drainage-tube is not shut off from the peritoneal cavity by a lymph-channel so soon, nor so perfectly, as in other cases, and it is quite probable that drainage in such cases plays a no less important rôle in the cure than the flushing, which should always be employed.

Some very successful operators, among whom I may mention my friend Dr. Dudley, of Chicago, use instead of the glass or rubber drainage-tube iodoform gauze. This is carried down to the bottom of the cavity and the outer end left in contact with the dry dressings; thus the absorption by the outside dry dressings keeps good drainage,

through the gauze, by capillary attraction. When drainage is done by this method, the gauze must be allowed to remain for several days, as its earlier removal will break up the adhesions which have formed around it, and thus open up the general peritoneal cavity to septic infection.

I think that this method of drainage is better applicable to cases of supravaginal hysterectomy or cases where large fibroid tumors have been removed, and the stump is large, than to simpler cases.

The great and efficient medium of drainage, available in all cases, is, however, the intestinal canal. The patient just operated on was well purged yesterday by sulphate of magnesium. To-morrow morning she will have half an ounce of sulphate of magnesium followed by an additional teaspoonful every two hours until free evacuations occur.

Formerly I gave the salts on the third or fourth day after a laparotomy, or sooner if tympanites appeared, or if there were serious rise of temperature or acceleration of pulse. Now, however, I wait for no such contingencies, but commence the administration of the purgative within ten or twelve hours after the operation is completed. Thus we generally prevent tympanites, peritonitis, and most of the associated evils and dangers. Should salts not be borne by the stomach, a Seidlitz powder or calomel may be substituted. Activity of the lymphatics is increased, absorption facilitated, and drainage completed, by allowing the patient, during the first twenty-four hours, but small quantities of fluids, merely a little water.

As you observed, I closed the incision (three inches in length) in the abdominal wall by five silk sutures, passed as closely as practicable to the margin of the wound, in order that not much tissue may be strangulated, but they of course include the peritoneum. In order to guarantee that the peritoneum should be included by each suture, and at the same time facilitate the work, the cut edge of this structure, on each side, was seized by a fixation forceps and drawn over the cut edge of the abdominal wall, and so held, until the sutures were inserted, both at the upper and lower angle of the wound. When the wound was closed and thoroughly dried, long narrow adhesive strips reinforced the sutures, then a small pad of cheese-cloth, containing between its folds absorbent cotton, was placed over the line of incision, then a broader pad, then a bandage, all of cheese-cloth. Thus the wound is dressed dry, no antiseptic of any character being employed. Formerly I dusted over the wound after the sutures were tied, before straps or pads were applied, iodoform, boracic acid, or something of that character. Now they are abandoned as useless. I brought the edges of the wound

in this case into perfect apposition, in a perfectly clean condition, thus meeting the requirements for immediate union. This is all that is essential. The sutures are examined on the fourth day. If any are cutting or unduly strangulating tissue, they are cut near the knot, but not removed until a day or two later. All sutures are to be removed by the sixth day, but the use of adhesive strips, renewed as may be necessary, should be continued for at least a month, and in some cases much longer.

Your attention has been called to the absence of all antiseptic agents in the external dressings. I need scarcely remind you that the instruments, sponges, sutures, and hands employed in the operation just completed were cleansed in simple warm water which had recently been boiled for half an hour. When the peritoneal cavity is flushed in these cases, in all my clinics, as you have seen, it is with plain water. The instruments, after use, are thoroughly cleansed in water and soap and then are kept in hot water for a few minutes before the operation is commenced. The hands are thoroughly cleansed simply in water and soap. The sponges were thoroughly cleansed after the last operation in which they were used, by processes which have been so often explained to you that I will not repeat them, then they are wrung out of a five-per-cent. solution of carbolic acid, in which they have remained for a few days, dried, and hung up in a linen bag, in a clean dry room, where they remain until they are again wanted, when they are wrung out of plain warm water as you saw to-day.

I advise you to use no chemical agents, of any character, either in the water for flushing the cavity or in the water in which your sponges are cleansed during the operation. Absolute cleanliness in everything connected with the operation; skill, thoroughness, and dispatch in its execution are the factors of success. I notice in the audience some strangers who may not be familiar with what we have done in this amphitheatre and at the Cincinnati Hospital during the past two years. Such gentlemen may ask whether the fact that these laparotomies are done in general operating amphitheatres where general surgery of every character is extensively practised by my colleagues, and where both their operations and my own are attended by from two to three hundred students, some of whom are not many hours out of the dissecting room when they enter the amphitheatre, will not constitute elements of serious danger, and at least demand the use of antiseptics. I answer no. Neither the hands of the students, nor the hands nor the instruments of my surgical friends touch my laparotomy patients.

How can they, then, infect them? The question need not find answer simply in opinion. It is answered by the clinical facts of which a majority of those present are cognizant.

I further attest my confidence in the soundness of these views by the promise that the patient upon whom I have operated to-day shall come before you again within ten days, not having had a temperature above one hundred, or a pulse-rate above ninety. Her speedy convalescence is almost a certainty. I speak not in vain boasting. Nevertheless, I speak boldly by authority of the valid laws of surgical science.

Unfortunately, I cannot speak with such confidence as to the restoration of this patient to perfect health. But as the operation discloses accuracy in the diagnosis, before made, and as all the symptoms complained of could reasonably be referred to the pathological conditions removed by the operation, we have a right to expect a cure.

Later note.—Recovery proceeding without interruption.

GENERAL MANAGEMENT OF OBSTETRICAL CASES IN THE CINCINNATI HOSPITAL.

CLINICAL LECTURE DELIVERED IN THE CINCINNATI HOSPITAL.

BY CHAUNCEY D. PALMER, M.D.,

Professor of Obstetrics and Gynecology in the Medical College of Ohio.

No accurate records of the mortality-rates of the obstetric wards of the Cincinnati Hospital are obtainable for many years in the past. The mortality-rate was evidently very high in those times, at least as compared with more recent experiences. It showed a decrease in, and after, 1881. The records from this date onward are as follows:

In 1881 there were 258 deliveries with 7 deaths.

" 1882	"	"	271	"	"	9	"
" 1883	"	"	168	"	"	1	"
" 1884	"	"	144	"	"	2	"
" 1885	"	"	162	"	"	1	"
" 1886	"	"	201	"	"	2	"
" 1887	"	"	202	"	"	4	"
" 1888	"	"	197	"	"	8	"
" 1889	"	"	199	"	"	2	"
" 1890	"	"	165	"	"	1	"

The diminution in mortality is evident. Within the last eighteen months, owing to the utilization of the most modern improved anti-septic precautions in midwifery, and the employment of young trained nurses from the training-school, the mortality-rate has, under all the circumstances, been exceedingly low, and is gradually getting lower.

At this time thorough cleanliness is looked after with all cases, and all practicable precautions are observed, as follows: At least two general baths per week are taken by each patient in cold weather, during the few weeks she may be under observation before delivery. In warm weather, the rule is for one to be taken each day. The patient's home garments are totally discarded, and an entire change is made for cleanly-washed hospital clothing. Any physical error in the

body at large, in the pelvic organs in particular, receives prompt attention. Daily examinations of the urine are made in all cases, and the frequency and constancy of albuminuria is recorded, together with the amount of albumin found. Careful measurements of the pelvis are made with the pelvimeter and finger, when there is any reasonable suspicion of a pelvic deformity, as awakened by the patient's age, physical conformation, or height, or by the past history of one or more difficult or prolonged labors.

As soon, now, as genuine labor has commenced, the patient is removed from the waiting obstetric ward of the third floor of one of the pavilions to the lying-in room of the second floor of the same pavilion; a bath given, if there be time; the rectum emptied by an enema, and the vagina and cervix uteri irrigated with at least one quart of quite warm bichloride solution, of a strength of 1 in 8000 to 4000. After the expulsion of the placenta, a similar injection is employed, to wash out and cleanse the vagina, make it antiseptic, to contract the uterus, favor involution, and prevent post-partum hemorrhage. No other vaginal injection is administered *during* parturition, unless manual or instrumental interference is practised; or *afterwards*, unless special local and general disturbances arise, such as offensive lochia, or local or general septicæmic action. The uterus itself is never washed out, unless a septicæmia cannot be controlled by vaginal irrigation and systemic medication.

While, theoretically, there have been held in mind the various contraindications to the use of the mercuric chlorides,—as, previous salivation, the presence of a diarrhœa or dysentery, or the presence of a decided albuminuria,—little or no attention has been paid to these contraindications. In all cases, these vaginal irrigations, as aforesaid, have been utilized, and no ill results have been observed in a single case to any degree. Many objections, doubtless, may be offered to them, but it will be found, on thorough analysis, that these are largely theoretical, and raised by those who have had no practical experience in their use. In my private practice I uniformly employ them, if practicable. Of the numerous cases of puerperal septicæmia which I have seen in consultation within the past year, in none had this prophylactic antiseptic measure been employed, if my memory serves me right.

Some three years since, when the mortality was over two per cent., the bichloride irrigation was employed occasionally,—never, as now, regularly or systematically in all cases. Now, as stated, it is utilized in all cases. In the year 1890 we have had but one death. Up to date, February 1, 1891, we have had three hundred and eighty cases,

with but a single death, which was from puerperal eclampsia. When we consider that the Cincinnati Hospital is a public charity hospital, supported by the city through general taxation, and that we are obliged to receive in it all cases applying for admission from within the corporate limits of the city, irrespective of time, place, circumstance, or surroundings, and before, during, or after parturition, some realization may be had of the good work being done here. Scores of cases each year are admitted just before, during, or, in some instances, after parturition from the most forlorn places in this city, without any preliminary care. As a matter of course, the mortality has been, and must be, influenced by these factors. When, again, we consider that the obstetric mortality-rate in private practice, good, bad, and indifferent, is about one in one hundred and twenty-five cases, or 0.75 per cent., it can be seen how favorable a comparison we make. This is about as low as has been obtainable in the Preston Retreat in Philadelphia, or in the New York Maternity, but not so low as in the Maternity of Paris, which has a lower mortality-rate than any other place on the face of the earth. But in view of the fact that our death-rates have improved, and are improving, it will not be long before the rates of recovery will equal those obtainable anywhere. Not only, too, have the death-rates in the obstetric wards of the Cincinnati Hospital been getting lower and lower, but the amount of serious disturbance after the parturition has correspondingly been diminishing. It is very exceptional for any pelvic pain, abnormal elevation of temperature, or abnormal alteration of the lochial discharge to be observed. Convalescence, in the vast majority of cases, is simple, prompt, and uninterrupted.

In my own personal experience here, which has extended over one-half of each year, I have noticed several cases of puerperal malaria, in which the temperature would run up to 103° or 105° F. These were unattended with any pelvic disorder, and have been promptly and entirely controlled by the administration of sodium salicylate and quinine.

Perineal lacerations, so frequently a matter of observation in years past, are comparatively uncommon now.

Semmelweis has been one of the greatest benefactors known to man. The first real step in our knowledge of puerperal fever, and its connection with septicæmia and pyæmia, was taken by him in his experiments in 1847. The name of Semmelweis in midwifery ranks with the names of James T. Simpson and Marion Sims in gynecology, of Jenner and Koch in medicine, of Lister in surgery, and of Von Graefe in ophthalmology.

ETIOLOGY AND TREATMENT OF ENDOMETRITIS.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC.

BY W. GILL WYLIE, M.D.,

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GENTLEMEN,—If in dealing with a disease we understand its etiology thoroughly, practice in cases belonging to that disease becomes very simple. This statement may seem self-evident, but if it is, its full significance is not appreciated, else more diligent search would be made into the true etiology of many complaints which are now but little better understood than as symptoms to be gotten rid of if possible. In nearly all cases the greatest difficulty lies, I think, in arriving at the true etiology. This is certainly true in gynæcology.

When I began the study of medicine there prevailed two sets of views regarding diseases of the uterus: one was entertained more especially by the older men, according to which everything was looked upon as an inflammation or ulceration. The treatment based on this view consisted in the introduction of a large speculum and applying nitrate of silver to the so-called ulceration of the neck of the womb. Sometimes a pessary was introduced, but the time for the almost universal use of this instrument had not yet arrived. That was in 1870. In 1872 I entered the Woman's Hospital. There I found that almost everything was supposed to be due to a displacement, and almost the sole aim of the gynæcologist was to correct the displacement. Dysmenorrhœa was supposed to be due to the inflammation which was set up by the displacement, and directly or indirectly nearly everything complained of by the patient was thought attributable to that cause. Therefore, every effort was made to replace the uterus and retain it in position. I do not believe that during the eighteen months I stayed in the hospital a single case was recognized as one of disease of the Fallopian tubes. In one case, upon which Dr. Thomas operated for a large clitoris, the patient afterwards developed peritonitis, and died sud-

denly. The post-mortem showed, according to the pathologist's report, abscess of the ovary; but I happened to be present, and on close inspection found that it was not an abscess of the ovary but a distended tube. The distended tube had burst, and set up a fatal peritonitis.

Since I left the Woman's Hospital a very great change has taken place. I believe, however, there was no marked change until we began to open the abdomen, which enabled us to understand better the real condition of things. Just previous to this, almost everything which was not supposed to be due to displacement was attributed to cellulitis. The majority of gynecological works at that day were taken up with cellulitis and displacements.

Not until very recently was much attention given to disease of the Fallopian tubes, and even disease of the ovaries was supposed to be confined almost exclusively to ovarian tumors. Little further was stated than that there were certain forms of ovaritis.

After having studied the diseases of women, in a more or less general way, up to ten years ago, I then decided to give all my attention to that department of medicine, and it soon occurred to me that most of the cases of disease of the uterus could be divided etiologically into two great classes. In the one class the disease is due to imperfect development, however varying may be its manifestation in different cases. For instance, I recognized that girls on reaching the age of puberty, or when about to develop into womanhood, are among civilized communities checked in physical growth. From the age of eleven to sixteen girls are expected to learn everything while being restricted in all bodily exercise. They are not only deprived of out-of-door exercises and chances for physical development, but often have not the best hygienic surroundings. The result has been that in a large percentage of the more highly civilized classes uterine disease is extremely common. It was a question at one time whether we did not have in this country nearly all of the gynecological cases, comparatively few existing in Europe. The reason why we found more cases here was the one just given, that our women, as a rule, are more highly civilized, the civilizing ways being of a nature to more or less exclude physical development. Whatever may be the relative proportion of cases existing here and abroad, I am satisfied that a large percentage of the diseases of women start in that one cause,—imperfect development. An imperfectly developed womb is, of course, weaker than a well-developed one. It takes on catarrhal disease much quicker. When the woman marries and becomes pregnant, the child's head passing the os will tear it much easier. If it does not tear it because it is imperfectly developed, it

will do so because of previous disease. You will find that nearly all cases of dysmenorrhœa, many of sterility, many of laceration of the cervix with subinvolution, and most cases of endometritis which you are called to treat are due in greater or less degree to imperfect development of the uterus. There is one class of cases which start in that way, and, as I have just said, it is a large one.

The other class includes the cases in which the disease is acquired. By acquired I mean that the uterus may have been well developed, but after giving birth to a child the woman, through want of cleanliness, starts up a local inflammation. It may not apparently amount to much, but it almost always indicates more or less septic trouble. The sepsis may be limited to the lining membrane of the uterus, or it may go on to cause puerperal fever, or it may result in subinvolution, chronic endometritis, or in displacements, with their accompanying symptoms.

Again, the husband may go somewhere else, and become the cause of his wife contracting a gonorrhœa. There is no question but that gonorrhœa will cause not only an endometritis, but even a salpingitis.

I would, then, make two great classes of cases of endometritis: first, those due to imperfect development; second, acquired cases, due to infection, usually gonorrhœal, or septic poisoning connected with childbirth. A third class would include special diseases, as, for example, new growths, fibroids, ovarian, and other kinds of tumors. By recognizing these three great classes etiologically, the subject is rendered much simpler clinically, and the indications for treatment become much clearer.

Not all of us see endometritis in the same light. Almost all cases which I look upon as endometritis and treat as such would be considered by my colleagues, especially the older men, as cases of pelvic inflammation, retroversion, and subinvolution. I look at it very differently. When the lining membrane of the uterus becomes diseased there is a very different state of things from what exists in an ordinary wound or point of inflammation. In the first place, the part affected is a narrow canal, lined by a mucous membrane filled with a great number of glands and follicles which secrete a fluid. Now, if the lining of that canal becomes inflamed and swollen, of course drainage must be very imperfect. The secretions are dammed up and the endometritis perpetuates itself for want of drainage. Then the disease is peculiar here in that once a month the uterus undergoes a change somewhat dissimilar to what we see in inflammation elsewhere,—that is to say, menstruation sets up a condition which is favorable to

the perpetuation or development of an inflammatory trouble. In still other words, a chronic endometritis is renewed in a degree by each menstrual period.

Although there is this difference of circumstances between an endometritis and an inflammation elsewhere, yet the plan of treatment is the same. If you have a sinus anywhere in the body which is imperfectly drained it will soon become covered by a false membrane. As long as there is a cavity behind the sinus which is imperfectly drained, the latter will not heal. In the uterus it is the same. What I have been trying to introduce into gynæcological practice is simply a good rule of surgery,—namely, wherever there is a diseased cavity, drain it thoroughly. Simple as that rule is, it was hardly known at all previous to ten years ago. Hundreds of cases are cured in a short time to-day by simple divulsion, curetting, and drainage, which previously remained uncured after weeks, months, and even years of treatment.

This plan of treatment will apply to almost any kind of endometritis,—the endometritis associated with imperfect development and dysmenorrhœa, that following miscarriage, that following gonorrhœa, etc. The main thing to do is to secure perfect drainage and bring about a complete change in the mucous membrane. When a case comes to me, the first thing which I think of is the differential diagnosis. The woman complaining of uterine trouble, I first determine whether there is disease of the uterus, and, if so, whether it is confined there, or whether it is complicated by disease of the tubes and ovaries. It is a fact that disease in the tubes and ovaries is almost always preceded by endometritis, and one very frequently finds a subacute condition of the lining membrane of the uterus associated with disease of the tubes and ovaries. The reason why we should differentiate with care between cases in which the disease is confined to the uterus, and those in which there is associated disease of the tubes and ovaries, is that the treatment in the two classes of cases is quite different, or, at least, the successive steps differ markedly. If the disease be subacute, and confined entirely to the uterus, you proceed to make dilatation and establish drainage; if it be associated with disease of the tubes and ovaries, you have to be very careful in treating the uterus, otherwise you may burst a distended tube or rupture an abscess of the ovary.

CASE I.—The first patient who presents herself here this morning is twenty-four years of age, married, but has never been pregnant. She menstruated first when sixteen years of age. She complains of sterility and of some dysmenorrhœa. Her marriage dates back four years.

The patient gives no history of what would be called inflammation about the womb; of what some would term cellulitis, but which I would call local peritonitis. An acute inflammation of the uterus very frequently simulates closely an inflammation of the peritoneum, so that it is often impossible to exclude the latter without the aid of time. You have about the same subjective symptoms in acute inflammation of the uterus as in a local peritonitis. In fact the inflammation of the womb may be so severe as to influence the peritoneal covering of the organ and give the true symptoms of local peritonitis.

Take a case of this kind,—one in which the woman has been married four years, giving a history simply of some dysmenorrhœa and sterility—and the old teaching would be that the pathological condition is due to ante flexion. According to my views it is due to a low form of chronic endometritis, with the mucous membrane and the secretions of a nature which prevents pregnancy, or the case is one of imperfect development, in which menstruation is not only imperfect, but the same is true of ovulation. Thus you will see that there may be sterility in women who are very little diseased. The uterus may be simply imperfectly developed, or the ovaries, for the same reason, fail to perform their function properly in order that impregnation can take place.

Now, with many the treatment here would be simply to put in a pessary, with a view of straightening the uterus. I do not believe this would have any more effect than if a man, having a very bad stomach-ache, and bent over, were straightened up and placed against a wall in order to relieve him of his pains. You would get about as much effect in the one case as in the other. The benefit which comes from this form of treatment is not to be attributed to straightening the uterus, but rather to the dilatation and the influence of the stem introduced into the canal. The dilatation and presence of the stem stimulate development. But there is danger in wearing the stem. The patient may develop a septic endometritis, a septic salpingitis, a local peritonitis, or a general peritonitis. But I am satisfied that if merely a support is obtained it has no practical influence. Instead, then, of introducing a stem and running the accompanying risks, it would be much better to simply introduce at first a boro-glyceride pledget, in order to bring about an improved condition generally in the pelvis, especially of the circulation; then, later, dilate the cervical canal with a steel dilator, apply pure carbolic acid to the cavity, and keep the uterus well drained. You can thus cure the majority of your cases. If at first you fail, simply carry the same idea a little further: divulse instead of dilating, curette, and then make applications as before. By the curet-

ting you remove the mucus and diseased mucous membrane in some degree, and then make application of pure carbolic acid, and leave in a drainage-plug a week. The drainage-plug is a hard-rubber plug or stem with a deep groove in it for the escape of the secretions. While that is in, keep the patient in bed. If that fail to give relief at the first period, you need not be much disappointed; you will only have to give the patient a little more time. You will have afterwards to occasionally dilate the canal and make an application of pure carbolic acid. In fact, the best evidence that you have cured a case like this, of dysmenorrhœa and sterility, is, that on introducing the sound into the uterus, it no longer gives the patient pain when passing through the internal os. The patient who is not cured will complain of a severe burning pain and tenderness when the sound enters the canal about three-quarters of an inch. As long as by your treatment the patient is free from this symptom she is practically cured, and the secretions, instead of being pus-like will have a clear appearance like the white of an egg. This indicates a condition in which it is possible for her to become pregnant.

Not until the patient has reached the condition where pregnancy is possible can she be said to be cured. The dilatation, curetting, and application of pure carbolic acid should always follow a menstrual period, never later than one week preceding the next menstrual period; nor should more than two treatments be made within the uterus in one month.

My objection to the use of strong acids or caustics, including caustic galvano-electricity, is that mischief results as well as good. If I should take a case of chronic endometritis and burn out the cavity of the uterus with any strong caustic I would certainly relieve the patient for a time, but the chances are that the nitric acid, the nitrate of silver, or the actual cautery would burn the uterus very deeply in one or two places and leave a scar. Now, a scar of itself is an innocent thing, but a scar in the uterus, in tissue filled with glands and follicles which must secrete fluid to keep the parts in a healthy state, is, owing to its locality, not so innocent.

Proceeding with the active treatment in this case, you see that the first thing done is to wash out the vagina with a solution of bichloride of mercury, one to three thousand. I do that always before using the uterine sound. After getting the os clean I dilate the cervical canal with a pair of steel dilators to a calibre of four or five lines. It hurts the patient at first, but is all over in a second. After having dilated, I take a silver tube which is just the length of the os, introduce it,

then pass through it some carbolic acid on cotton wrapped about an applicator. Six drops, as a rule, is sufficient when applied in this manner. But it is not rubbed off in passing through the os. The reason why intra-uterine applications made in the past usually failed was that the fluid got rubbed off on the cervix before reaching the cavity. The little silver tube which you have seen me use in this case prevents that.

To return to the objections pertaining to the caustics, as I said, they leave a scar in tissue which is filled with glands. If you use nitrate of silver you bring about a change and very good results for a time, but a scar is sure to form, covering the mouth of the glands. Now, when the glands are closed the secretions are pent up underneath and produce indurated tissue along the line of the scar. That, too, is why a laceration of the cervix does so much harm. It is not because of a laceration through perfectly healthy tissue. When the cervix is torn it is preceded usually by disease which has rendered it brittle. When the tear heals the scar shuts up glands and follicles, which accounts for there being so much indurated tissue surrounding it. When you burn the structures with nitric acid, nitrate of silver, or the galvano-cautery, you get practically the same result. That is, the glands and follicles are shut off in such a way that they do not drain. They form a hard, an indurated mass, and, although the local inflammation may not be very great, the reflex symptoms are sometimes very severe. You can to-day find women with scar tissue about the os and vagina on whom nitrate of silver had been used in the past or even recently. The indurated masses left by the caustic vary in size from that of a pea to that of a horse-chestnut. The shutting up of the glands and follicles results in all kinds of reflex symptoms. On that account I have for twelve or fifteen years used nothing stronger than a mixture of iodine and carbolic acid in making applications to the mucous membrane of the uterus, and I claim that by divulsion, scraping or curetting, and the application of pure carbolic acid, you can get just as good results as from any strong acids, and run no risks whatever.

When I say you cure the dysmenorrhœa or the chronic endometritis by divulsion, curetting, and applying carbolic acid, of course I do not mean that, having relieved the symptoms, you have necessarily cured the woman of her imperfect development and general bad health. The chances are that the uterine catarrh will come again after some months, but all you will have to do will be to repeat the treatment, whereby you will cure her again.

CASE II.—Our next patient, aged thirty, has been married ten years. She has had six children, the last one two years ago; two miscarriages, the last one three years ago. She has had intense pain in the back and across the abdomen, and dysmenorrhœa.

Now, the treatment which I have related must be applied only in cases uncomplicated with disease of the tubes and ovaries. If a case come to you and a history be elicited of local peritonitis, or if on examination you find the uterus fixed by adhesions or thickened tissue in the neighborhood of the broad ligaments, then you must wait a good while before giving any intra-uterine treatment. That is, it would not be safe with indurated tissue in the broad ligament to pull the uterus down, dilate it, and curette, for in doing so you might tear some of the adhesions around the diseased tube and ovary, and set up a severe if not a fatal attack of peritonitis. In such cases it is frequently necessary to treat the diseased tube and ovary before treating the uterus. Where the patient gives a history and indications of repeated attacks of peritonitis with the presence of pus, nothing but laparotomy will do any good. After removal of the diseased tubes and ovaries the patient, as a rule, is relieved of nearly all her symptoms. But she must go through the change of life, the uterus must atrophy and contract the same as after the menopause, and if the organ has been diseased, as it nearly always has been preceding the salpingitis, then the patient will suffer. If you wish to relieve this source of trouble you have only to dilate, curette, and drain,—that is, treat the case exactly as you would a chronic endometritis. You soften the tissues, you get drainage, and the atrophic changes of the menopause can take place in a much more normal way. In fact, what I consider to be the main cause of reflex nervous symptoms at the period of the menopause is the effect of previous disease on the tissues of the uterus which prevent the usual changes from taking place at this date. That is, the uterus cannot atrophy and shrink away if the tissues are or have been in a diseased state. That fact was impressed upon me twelve years ago. I was able to take women suffering from hot flashes, some so nervous that they had to be confined in asylums, and by simply softening the uterus, dilating, and curetting,—in other words, treating them just as I would a patient for chronic endometritis,—thus relieve their symptoms completely.

You will find this to be true, that, if you take the case of a girl with endometritis and dysmenorrhœa and pass the sound, you will notice as the instrument reaches the os internum that the patient will complain of severe pain. Take the case of a woman who suffers from

hot flashes and excessive nervousness at the menopause, examine her, and you will find the uterus movable, not much enlarged, the cervix healthy, and yet, if you introduce the sound, the minute it touches the lining membrane of the uterus the patient will have a severe burning pain, exactly like that in simple atrophy of the uterus in the young girl. Now, dilate, curette, apply pure carbolic acid, drain, and you will cure your patient, and do it after a few applications. If the symptoms return a few months later, simply repeat the treatment.

CASE III.—This woman gives the symptoms of chronic endometritis. The uterus is hard, indurated, retroverted. To the left of the organ I can feel an old scar with a nodule in it the size of an English walnut. From the history I know the patient has had a pelvic abscess on that side.

I now recall the case distinctly. The patient came into Bellevue Hospital a few weeks after she had had a miscarriage. She had had severe chills and was sick several days previous to her admission. We found the temperature to be 105° F., the pulse very rapid, the abdomen distended and very sensitive. Examination by vagina revealed a tumor larger than a child's head in the left iliac fossa, pressing low down in the pelvis and pointing in Douglas's pouch behind the uterus. Now, if this woman had had only slight fever, and the tumor had been so placed that it could not have been reached easily by Douglas's pouch, I would have performed laparotomy at once, for we now know that nine times out of ten when a woman has a pelvic abscess she has had diseased tubes and ovaries. Acute cellulitis must be very rare, and chronic pelvic cellulitis has been proved never to exist,—at least we have not been able to find it in several hundred cases at Bellevue Hospital.

But in this case, instead of opening the abdomen and running the risk of emptying pus into the peritoneal cavity, I drained the abscess by means of a trocar introduced through the vagina. The canal made by the trocar was dilated, and a double drainage-tube introduced and sewed to the surface to keep it in place. The result was that the septic symptoms disappeared at once. Drainage continued several weeks. The patient got up from bed, but still had a good deal of pain. The uterus was large, retroverted, and fixed. I told her then that if she wished to be cured there was but one way,—namely, to open the belly and take out the remnants of the diseased tubes and ovaries,—but, as she had three young children, I preferred not to operate then. She has now been coming here three years. The symptoms were relieved by boro-glycerin cotton pledgets. For a long time we did not dare make

intra-uterine applications, because we did not know how much it might disturb the old disease in the tubes and ovaries. But, as the case became more subacute, we dilated, and treated it as one of chronic endometritis.

As I said, this case is one complicated by retroversion of the uterus; the organ is thrown backward from its normal position, and there fixed by peritoneal adhesions. A good many gynaecologists would advise you to introduce a repositor into the uterus and break up the adhesions, but I believe that to be a mistake. I am satisfied that if you take a case of retroversion with adhesions, put the patient under ether, and replace the uterus by breaking up the adhesions, you will subject her to greater danger than is incurred by laparotomy performed at the hands of an expert. The reason is that nine times out of ten your case of retroversion with adhesions is accompanied by and caused by salpingitis or ovaritis. Besides, you may try to break up the adhesions, but very often they are not broken up when you suppose they are. The walls of the uterus merely stretch, and you will be almost certain to tear some of the tissues about the tubes and ovaries and have hemorrhage. If there be pus, this may escape into the peritoneal cavity. At any rate, there will very likely be a fresh attack of salpingitis and oöphoritis, and, if this should happen, you cannot tell what it may lead to. If it is desirable to break up the adhesions, it is better surgery, knowing that nine times out of ten retroversion means disease of the tubes and ovaries, to open the belly, and see what you are doing, and, if you find the tubes and ovaries diseased, remove them. If the tubes and ovaries should not be found diseased, then simply break up the adhesions, shorten the round ligaments, and close the abdomen. I believe an expert operator can to-day do that a hundred times and not lose more than one case; whereas, if one were to take a hundred cases and break up the adhesions in retroversion without opening the abdomen (and by breaking up I mean *breaking up*), there would be, I think, many more deaths. There would almost certainly result local peritonitis in a number of cases, due to disturbance of a diseased tube and ovary. In fact, I regard the uterine repositor as a useless instrument except for purposes of diagnosis.

CASE IV.—Our next patient is aged forty-two, married, and has had four children, the last one ten years ago. She has had two miscarriages, the last one seven years ago. Since menstruation ceased two years ago she has had severe pain in the left iliac region, the pain being particularly severe during the past two weeks. The patient belongs among those who come to the physician after the menopause, suffering

from severe local pain, together, generally, with reflex nervous symptoms, the result of induration or abnormal condition in the uterus which prevents atrophy and such changes as normally take place at that time. Here I find a small, indurated, movable uterus, and the tissues of the vagina smoothed out, indicating atrophy. So far as can be made out by an examination of the patient on her back, there is nothing specially abnormal about the uterus. If the woman be suffering from any local disease at all, by placing her on the side and passing the sound you will elicit severe burning pain. In that event you should, besides improving her general condition, divulse or dilate and apply pure carbolic acid; repeat in ten days, and I can guarantee that you will thereby relieve almost all of the reflex symptoms.

Suppose a woman should come to you and say that for the past week she had had a burning discharge. If on vaginal examination you should find a vaginitis and irritation of the urethra, you would very strongly suspect gonorrhœa. The question would then come up whether you should examine for an endometritis. Now, in a case like that, I should advise you to first wash out the vagina with an antiseptic solution, say a weak solution of carbolic acid; do this frequently for at least twenty-four or forty-eight hours before making further examination. With this precaution, if the disease has not reached the uterus, you will not carry it in with the sound. But suppose the inflammation has gone farther, and there is an acute endometritis, should you at once dilate, curette, and drain? That is an important question, one which I am not quite ready to answer. I have tried both ways, and the best result has been obtained, I think, by instituting almost complete rest and the use of simple vaginal douches until the endometritis has become subacute. After it has become subacute I have gone on and treated the case as one of endometritis calling for dilatation, curetting, and draining. The usual course of the gonorrhœa is to pass from the vulva to the vagina, from the vagina to the uterus, and from the uterus to the tubes and ovaries. In a woman who has never borne children the gonorrhœal inflammation is much more likely to limit itself to the vagina and uterus, and not pass on up into the tubes.

In almost all of my first hundred cases of laparotomy the patients had borne children or had had abortions. In fact, I believe that only one had had neither a child nor an abortion. Salpingitis, therefore, is not nearly so likely to take place in the uterus which has not been impregnated as in the one which has been so. Why an inflammation is much more likely to extend from the latter than from the former is difficult to say, but it is true, and furnishes the reason for my doubts,

long entertained, whether salpingitis is often due to gonorrhœa. I think the great majority of cases of salpingitis, certainly of pyosalpinx, are due to puerperal sepsis, and not to gonorrhœal infection. Yet the more I study the cases, the more I become convinced that a very large number of them, particularly those of unilateral salpingitis, are due to extra-uterine pregnancy. I have lately had two or three cases confirming that view. Two cases which came under observation this fall presented the typical signs of salpingitis, yet an operation showed a distended tube which contained a blood clot due to tubal pregnancy, the foetus itself being found as positive evidence. Yet twenty years ago, when I was a student, extra-uterine pregnancy was scarcely ever mentioned. I scarcely knew that there was such a condition even after passing through Bellevue and the Woman's Hospitals. Now, scarcely a winter passes that I do not operate on from four to eight cases. The difference is that now we recognize the condition; then we did not. In looking over my first hundred cases of salpingitis I find quite a number that were unilateral, which I am satisfied were cases of extra-uterine pregnancy.

DIAGNOSIS AND TREATMENT OF UTERINE MYOMATA.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA HOSPITAL.

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GENTLEMEN,—I am about to direct your attention to a patient with the following history: A colored woman, sixty years of age; domestic; mother of twelve children, all dead; has had fairly good health until three years ago, when she noticed an enlargement of the abdomen, which has steadily increased. This enlargement is variable. Sometimes the abdomen is quite distended, at other times she is fairly comfortable. She suffers a great deal of pain and distress in the lower portion of the abdomen, particularly in the pelvis. She says that she has for a number of years suffered from rather excessive menstruation, and has never ceased to menstruate, which is rather unusual in a woman of her age. The menstrual flow has been somewhat irregular, occurring too frequently and very much prolonged; she has had a bloody discharge the greater part of the last six weeks, and has become very much emaciated from the distress and discomfort due to the growth, and by the prolonged and profuse menstrual discharge.

As the patient lies upon the table with the abdomen exposed, we see that its surface is covered with striæ, indicating the rupture of the middle layer of the skin induced by some previous distention. That these striæ are not recent is evident from their appearance, as in recent cases the skin in the cicatrices would present a pinkish appearance. The abdominal walls are very thin, permitting this mass to project through them, showing its outline completely. We see that the abdomen is distended more particularly upon the left side, where the enlargement extends two or three finger-breadths above the umbilicus. On the right side there is a projection above the right ilium, which is quite

marked. Placing the hand over the abdomen, the mass upon the left side, apparently about the size of a child's head, can be pushed about in every direction and tilted over, showing that its inner surface is flattened, and that it presents a sharp margin or edge similar to what we would expect to find in the spleen or liver. The mass upon the right side is also flattened upon the surface that lies in contact with the abdominal wall. The opposing growth has a nodular projection in front, and extends deeply into the pelvis. This portion is slightly movable, the whole mass being hard and firm, and showing no indication of fluctuation.

By vaginal examination the finger comes in contact with a hard, dense mass projecting forward through the posterior wall of the vagina to within an inch of the vulva. This mass fills up the pelvis, and the finger can be passed over it behind the symphysis, where higher up is felt a teat-like projection indicating the remnants of the cervix. On moving the mass upon the right side the projection in the pelvis can be felt to be associated with it in its movements. You will naturally ask, "What is the character and source of this growth?" That it is not pregnancy is evident from the age of the patient, the consistency and character of the growth, and its peculiar relations. I would not have you to infer that pregnancy could not exist in a woman at sixty, for such cases are on record. The situation of the growth, however, would indicate that it is either associated with the uterus or the ovaries. Ovarian growths are not uncommon in women of her age, but the tumors are most frequently of a cystic variety; while the growths in this case are unquestionably solid. It is true that we may have solid tumors of the ovary, but such tumors are usually small in size and occur earlier in life. Tumors involving the uterus are such as partake of its structure and are hence called myomata. These growths usually occur during the period of active menstrual life of the individual, and rarely make their appearance so late in life as in this particular patient. The peculiar character of these growths, their situation and relation, lead me, however, to say, unquestionably, that we have in this patient to deal with uterine myomata. The tumor from the right is attached to the mass on the left by a pedicle somewhat long and slight, which permits of its greater mobility. The mass upon the right evidently involves the greater part of the fundus uteri.

These growths vary in character according to their situation; they originally consist of a hypertrophy of the tissue of the uterus. Why this should occur, our knowledge does not yet enlighten us. They develop in the walls of the uterus, either singly or in large numbers,

and, as they increase in size, are known as submucous, mural, or interstitial, and subperitoneal. The submucous variety in their progress of development are pushed out of the uterine wall into the cavity of the uterus, and hence are covered to the extent of their projection by the uterine mucous membrane. Where the tumor is situated in the cavity of the uterus and hangs from the wall by a more or less distinctly defined pedicle, it is known as a polypus. Where it is attached by a particularly broad base, it is called a sessile tumor. In some cases the tumor is situated equally distant from the membrane lining the uterine cavity and the peritoneum; such a tumor is spoken of as interstitial. The other variety comprises those which, by the contraction of the uterus, are pushed out of its walls beneath the peritoneum, and are called subperitoneal; such a tumor is the one situated upon the left side of the abdomen in the patient before us.

These tumors vary greatly in size, from growths the size of a pea to those filling up the entire abdomen and weighing fifty and sixty pounds. The symptoms arising from the growths are dependent somewhat upon their situation. In the submucous and interstitial varieties, where they project into the cavity of the uterus and produce alterations in the condition and circulation of the mucous membrane, hemorrhage is a marked symptom. This may be in the form of menorrhagia or metrorrhagia. In the subperitoneal, and some forms of the interstitial, the tumor may attain to a considerable size before its presence is suspected, and it is only by the influence upon the general health of the patient, through its weight and pressure, that its existence is ascertained.

These growths usually present a sensation of a hard dense mass, but occasionally we find in examination of the case that it is difficult to determine whether the tumor connected with the uterus is solid or contains fluid. A case came under my observation, within the last two years, of a woman forty years of age, who had been suffering from an abdominal distention for less than a year. This distention extended to the umbilicus, was symmetrical and regular in outline, and upon examination I had no hesitation in saying that the patient was suffering from a uterine myoma, and I advised an operation for its removal. Three weeks later she entered the Medico-Chirurgical Hospital, and, in the examination before the class, I found the abdomen considerably increased in size, and presenting a sensation closely bordering upon fluctuation. The elasticity was so marked that I was greatly disposed to modify my diagnosis, and believe that I had to deal with a fibro-cyst of the uterus, or an ovarian tumor with thick viscid contents, and closely associated with the uterus. An operation was

done, when it was evident that the tumor was uterine. A large hæmatocele was opened posteriorly to the growth, which required a drainage-tube to be inserted into it. The mass was removed, and one of my colleagues, upon examining it after removal, said that it was a fibrocyst. An incision through the mass, however, disclosed the fact that it did not contain a single cyst, but was an œdematous fibroid. Nearly a gallon of water drained out of it within twenty-four hours after its removal. The patient recovered.

Besides œdema these growths are found to undergo other changes,—a substitution of fatty material for the fibroid tissue, or a calcification through a deposit of calcareous material. I operated upon a patient fifty-four years of age in the Philadelphia Hospital some years ago, in which a portion of the tumor had become so calcareous that it gave a clicking sound when thrown into the basin. This deposit of lime in the tumor has the influence of limiting the growth. This fact was made use of by Simpson in the treatment of these tumors, and he administered the chloride of lime with this in view. Unfortunately, however, it was soon found that it was impossible to limit the calcareous change to the tumor, and that it took place in the aorta and valves of the heart, leading to changes more grave than the tumor itself.

These growths are very erratic in their development, sometimes being exceedingly rapid in their progress, at other times stationary or even retrogressing. They occur during the active menstrual life of the individual, and usually cease growing or even retrogress with the appearance of the menopause. It should be remembered, however, that the presence of such a growth is likely to delay the establishment of the climacteric often for years, as in the case of the patient before us, so that it is not well to put off a patient suffering from such a condition, with the hope that she will gain relief with the occurrence of the change of life. Under the influence of intercurrent diseases, these growths are oftentimes completely absorbed. Thus, in the progress of pregnancy, we may find at times, that with its development and the subsequent processes of involution the tumor completely disappears. A case came under my observation in which there was quite a large fibroid projecting from the anterior wall of the uterus, which gave rise to a great deal of discomfort from its pressure upon the bladder. The patient became pregnant, and I had an opportunity to examine her a few months after her delivery, when I was unable to find the least vestige of the growth. In other cases the presence of pregnancy seems to accelerate the growth and it attains to an enormous size, so much so, indeed, as to have necessitated, in a case under the care of Schroeder,

the removal of the uterus during the course of pregnancy. The progress of the growth is also influenced by the general nutrition of the body. The knowledge of this has been made use of by Saulsbury in recommending a special diet for these patients with a view of having the nitrogenous material taken up under the influence of natural agents. These growths sometimes lose their vitality and are thrown off as a slough. A case of this kind came under my observation but recently, the history of which is as follows :

"On the 9th of December, 1890, I saw a patient in consultation with Drs. Markley and Newbury, near Hatboro', Pennsylvania. The patient was a strong, healthy woman, thirty years of age, who had been married four years without having had any arrest of her menstruation. She had experienced no especial trouble, with the exception of rather free menstrual flow, until about ten days before I saw her, when she called upon her physician, Dr. Markley, complaining of severe bearing-down pains and a bloody discharge. Although she had had no cessation of her menstruation, she supposed herself to be pregnant and undergoing a miscarriage. Her physician at first supposed this to be correct, but, finding the progress of the case to be irregular and the physical signs not corresponding, called Dr. Newbury in consultation. Both gentlemen, having made a careful examination and found a mass in the pelvis which it was deemed necessary to have removed, made an unsuccessful attempt to do so. I was called in to see the patient, and learned that she had had a chill that day and had a temperature of 102° F. The odor of the room was exceedingly offensive. Upon examination I found the uterus dilated, admitting the index finger, and the cavity filled up with a large mass which was quite elastic. I was somewhat in doubt, at first, as to the character of this condition, but judged that it was an intra-uterine fibroid which had undergone supuration. One finger was forced into the cervix and following this a second, dilating it with the two fingers. With the fingers pressing upon the mass it was separated from the uterus and enucleated as far as the fingers could reach, the cervical canal having been enlarged by nicking it on either side and posteriorly, and then dilating with the fingers. A pair of vulsellum forceps were passed into the cavity and the tumor seized. Great difficulty was experienced in traction, for the reason that the mass was so decomposed that the forceps would tear through it and portions of the tumor be torn away. We finally succeeded in enucleating it, and with repeated grasping of portions with the forceps, at last delivered the whole mass. The mass when out was considerably larger than a child's head. The capsule of the tumor was then drawn

down and peeled out, leaving simply a uterine shell into which the hand could be passed. This was irrigated with an acid sublimate solution of a strength of $\frac{1}{4000}$, and an iodoform tampon put into the uterus to serve as drainage."

Myomata show a marked predisposition to appear in the colored race, and are more frequent in the unmarried than in the married; in the sterile than in the fruitful. The occurrence of such a growth associated with the number of children borne by the patient now under observation is exceedingly unusual.

In the larger growths, such as this one, the diagnosis of the condition is not a difficult one. In cases, however, in which the growths are small and are situated within the cavity of the uterus, the diagnosis is sometimes exceedingly difficult. Ordinarily it will be found that the fundus of the uterus will be somewhat increased in size, that it will be hard and dense, and that a nodule or growth from its walls can be readily determined. There are cases, however, in which the examination can only disclose an enlargement of the fundus of the uterus, which may be due to a chronic inflammation of the organ rather than to any growth within its cavity. A growth of this kind occurring near the climacteric, attended by profuse hemorrhage of an irregular character, might be mistaken for malignant disease of the body of the organ.

Within the last year I was asked to see a patient forty-five years of age, the mother of several children, who within a few months had been taken with profuse bleeding at her monthly periods. She also suffered from considerable pain in the body of the uterus. Upon examination the fundus of the uterus was found slightly enlarged, perfectly symmetrical in outline, and not unusually firm and dense, while the introduction of the sound into its cavity was attended by violent bleeding. This condition, taken with the age of the patient, led me to confirm the suspicion of the attending physician, that she was suffering from malignant disease of the body of the uterus. The patient, without further examination, was, a few days later, subjected to an operation for the extirpation of the uterus, from which she recovered without an unpleasant symptom. Upon examination of the specimen, however, I was very much disgusted to find that there was a fibroid the size of a hickory-nut projecting into the cavity of the uterus from its posterior wall, and from this, and not from malignant degeneration, had come the hemorrhage from which she had suffered. This case emphasizes the importance in all such conditions of making a thorough examination of the uterine cavity to determine the diagnosis, if necessary after it has been dilated. Dilatation by the repeated packing

of iodoform gauze serves as an excellent and safe means for accomplishing this end.

The larger growths, and particularly the œdematous variety, are sometimes difficult to differentiate from an ovarian cyst with thick viscid contents. The bimanual examination, by which we determine the association of the growth with the uterus, will usually be sufficient to distinguish the uterine from the ovarian growth. In a case in which the mass is so closely attached to the uterus that this measure would not aid us to determine the question, the end may be accomplished by having an assistant drag upward upon the tumor, while another holds the cervix down by a pair of strong vulsellum forceps, and the operator introduces one or two fingers into the rectum. In this way the attachment between the ovarian growth and the uterus can be lengthened, and the uterus readily outlined. If the examination cannot otherwise be satisfactorily carried out, the patient should be placed under an anæsthetic.

Treatment.—Under the subject of treatment we find an almost infinite variety of methods of procedure. The peculiar character of the growth, its progress and development, its tendency, at times, to undergo retrogressive processes without definite cause, has led, on the one hand, to the laudation of special methods of treatment, on the other hand, to doubt as to the efficacy of the administration of any remedies. There are certain remedies, however, which have from time immemorial obtained consideration as being efficacious in the treatment of these growths.

Chloride of ammonium is recommended by Atlee, and has been used largely by Drysdale, with, as he claims, very marked benefit. Others have claimed to have found but little, if any, alteration resulting from its use. As has already been said, Sir James Y. Simpson highly praised the use of the chloride of calcium, for the reason that it induced changes in the surface of the tumor by which large quantities of calcareous material were deposited, converting the tumor into bone. This remedy, however, was found to exert an influence of a similar character in the coats of the large vessels and the valves of the heart, which rendered it a dangerous remedy to use. Saulsbury places his patients upon a rigid meat or animal diet, cutting off the sugars and starches, and in this way has found that the tumor has been greatly reduced in size, and, in some cases, made to disappear entirely. The bromide of potassium has also been highly recommended for its alterative influence upon the uterus, quieting the nervous irritation and, in this way, decreasing the rapidity of growth.

When we study the development of these tumors, we see that when they have reached a certain stage and have become sufficiently large they are no longer contained in the walls of the uterus, but with the contraction of its muscular fibres are extruded, either into the cavity of the uterus or beneath its peritoneum. This, indeed, has been made use of in treatment, and has suggested the administration of remedies which will promote the uterine contraction and so hasten the extrusion of the growth. Remedies having this influence are the oxytocics, of which ergot is the most effective. Other remedies of the same class are gossypium and *ustilago mädidis*; while quinine, strychnine, and antipyrin act in the same manner though to a lesser degree. Ergot, indeed, has a double action in the treatment of these growths. It acts by its general contracting influence over the involuntary muscular fibre of the vessels of the body. In the second place, by its direct action upon the muscular fibre of the uterus, it increases its tendency to extrude the now foreign body. Ergot may be given by the mouth, by the rectum, or hypodermically, and may be continued over a long period of time, and given in large quantities. The objection to the hypodermic method is the inflammation which takes place about the points of puncture, and the danger of subsequent formation of abscesses. It is more particularly efficacious in those varieties of tumors in which the growth is situated within the cavity of the uterus. By increasing the uterine contraction the growth is pushed farther into the cavity, or is caused to dilate the cavity and be extruded into the vagina. The plan of treatment is not without danger, in that it may give rise to a too rapid separation, arrest the nutrition of the growth, and lead to its sloughing. In that case the patient may be subjected to the danger of death from septicæmia. This is particularly important in cases of subperitoneal growth, where the separation of the tumor may be so rapid as to lead to its destruction and decomposition in the abdominal cavity, followed by an attack of peritonitis. Then, again, the treatment is only efficacious in those cases in which there still remains about the tumor an amount of muscular tissue sufficient for its expulsion. If the tumor is situated in the wall, involving the greater part of the structure of the uterus, administration of remedies would be inefficacious in effecting an extrusion, as there would not be remaining a sufficient amount of muscular tissue to accomplish it. The method of treatment is also objectionable in cases in which the patient is suffering from hemorrhage as a marked symptom. Here the ergot may be insufficient to control the hemorrhage, and the patient has meanwhile recurring attacks that may cost her her

life. It has also the disadvantage of being exceedingly slow, requiring a long time for the accomplishment of any result; and, where the patient is dependent upon herself for her own support, and often that of her family, she cannot take one or two years, perhaps more, to relieve diseased conditions which may be remedied in a few weeks.

Electricity for a long time has been a recognized agent in the treatment of such conditions. Its use was introduced many years ago in this country by Cutter and Kimball, of Lowell, Massachusetts.

The method of treatment was to pass spear-shaped electrodes, insulated except at their points, through the abdominal walls into the tumor, and to send strong currents of electricity through them. Apostoli has, in later years, rendered this method of treatment still more popular by his improved methods of measuring the current, and by the use of a large electrode externally, and a trochar or spear-shaped electrode internally. This method has been highly recommended and advocated by Keith, of London, by Spencer Wells, and many others. It is without question an efficacious method of controlling hemorrhage, and of arresting many of the unpleasant symptoms to which patients suffering from uterine myomata are subject. It is, however, by the confession of its strongest advocates only a palliative method of procedure. In rare cases only was the originator able to do more than to limit the further development of the growth. In cases in which hemorrhage is a marked symptom it is likely to again recur. The method of treatment is also not wholly without danger, as it acts by electrolytic action, and we may have sloughs resulting from the diminished nutrition of the growth. The method of treatment by puncture, a trochar being thrust into the growth and strong currents being passed into it, has been discontinued for the reason that it was found to be excessively dangerous. The electrolytic method also requires a long time for the accomplishment of even temporary relief, and again, is objectionable in the class of cases whose means will not permit them to give much time to the treatment.

The surgical treatment is dependent very largely upon the character and seat of the growth. We would not, of course, deal with multinodular growths in a manner similar to that which we would use for a single intra-uterine or extra-uterine mass. Where the growth is situated within the cavity of the uterus and is attached by a pedicle, more or less well defined, the treatment would consist in its prompt removal. Where the cervix is well dilated, this may be done by grasping the growth with strong vulsellum forceps and twisting it until the pedicle is broken through, or the pedicle may be cut through with

the scissors, by a sharp-edged hook, by a wire *écraseur*, or by the galvanic cautery. Hemorrhage is not likely to be marked in any of the methods of removal. Where it is, it can be readily controlled by packing the uterine cavity firmly with iodoform gauze. This method of controlling hemorrhage is far preferable to that by the injection into the cavity of any of the iron solutions.

Where the tumor has not yet attained sufficient size, or been sufficiently extruded to dilate the cervical canal, dilatation may be performed by the introduction of gauze tampons. Persistent effort at dilatation will accomplish the stretching of the cervix very rapidly even in those cases in which it was not all dilated at the outset, as in the case mentioned in the early part of this lecture, where a large sloughing fibroid was delivered through an opening which at the beginning of the operation would admit only the point of the index finger.

In an operation some years ago, for the removal of a fibroid as large as a small orange, the cervix was dilated and incised. After the delivery of the mass a drainage-tube was inserted into the cavity of the uterus, through which it was frequently irrigated. The patient recovered.

The fact that the tumor is not pedunculated would not contra-indicate the performance of an operation for its removal. Indeed, many of these tumors may be attached by a broad base or over the whole of one side of the uterus. The cervix being thoroughly dilated, the mucous membrane covering the surface of the tumor is incised down to its capsule and the growth then enucleated. This may be done, preferably, with the finger as far as it may reach, and the extent to which this may be attained can be greatly increased by traction upon the tumor with strong forceps; and where its further removal by such means is no longer feasible, the serrated spoon curette, first recommended by Thomas, can be effectively used for further separation. In this way large submucous or even interstitial tumors may be removed. If the tumor is too large for delivery, it may be cut in pieces by taking strong scissors and cutting away the tissue until the whole tumor is entirely removed. The enucleation of this large mass, however, particularly when of the interstitial variety, is not infrequently attended with subsequent danger to the patient, by affording a large cavity, whose walls are liberally supplied with absorbent vessels, favoring the development and absorption of septic material and thereby producing profound septicæmia.

A case came under my observation recently, in which a large submucous tumor had been enucleated, and, from the usually careful methods of the operator, I have no doubt that this was done with the most

careful antiseptic precautions. The cavity of the uterus was subsequently drained by a tube and frequently irrigated, but at the time the patient came under my observation she was suffering from marked elevation of temperature, without any pain or distress in the pelvis or abdominal cavity. Upon examination, the vaginal portion of the cervix and the cavity of the uterus, so far as we could see, was lined by a diphtheritic exudation. There had been, unquestionably, an implantation of diphtheria upon its raw surface, the great extent of which accounted for the very rapid entrance into the blood of the germs. The patient survived some three weeks, during the greater portion of which time she had a temperature of 103° F. and over.

Unless a submucous tumor can be readily reached and enucleated, the preferable plan of procedure would be the removal of the uterine appendages. This operation, if carefully done (and by carefully done I mean the *entire* removal of the ovaries), brings about a cessation of menstruation and the subsequent retrogression of the growth. It is an operation much less dangerous than would be the enucleation of an extensive growth through the vagina, particularly when the entire cervix would have to undergo dilatation. Some nine months ago an unmarried woman was brought to me by Dr. North, of Pleasantville, New Jersey, suffering from an abdominal distention. Upon examination there were found an ovarian cyst and a uterine fibroid. Operation was done, at which the ovarian cyst and the other ovary were removed. The fibroid growth presented a mass, of the subperitoneal variety, of the size of a goose-egg in the anterior wall of the uterus, but without the formation of a pedicle, and it was allowed to remain undisturbed. Upon examination of this patient a few weeks ago, I found the womb but slightly enlarged, the tumor having almost completely disappeared.

It is not an infrequent thing to find that the tubes and ovaries are the seat of diseases complicating the presence of uterine myomata. These conditions oftentimes lead to marked difficulty in the diagnosis. Thus a patient, the wife of a physician, was operated upon during the past summer, on account of a large mass filling up the pelvis and projecting into the abdomen nearly to the umbilicus. She had suffered from frequent hemorrhage and had had repeated attacks of pelvic peritonitis. Some fourteen years previously she had presented herself to a prominent surgeon of this city, giving the history of an attack of peritonitis and the discharge of pus by the rectum. Upon examination he discovered a growth filling the pelvis, and informed her husband that she was the victim of fibro-sarcoma. The continued repetition, however, of the attacks of peritonitis and the

duration of the growth led me to make the unqualified diagnosis of uterine myoma complicated by pyosalpinx, and to advise an operation with a view to the removal of the uterine appendages. This operation was done on May 22 of the present year, and, as the tubes and ovaries were firmly adherent to the sides of the growth, and, as this was fixed in the pelvis and would only admit a finger to be passed between it and the bony wall, the enucleation of the appendages was attended with some difficulty. The patient convalesced slowly, but subsequent communications from her husband have informed me that she is now in better health than she has known for years, that the growth is subsiding, and that the hemorrhage and unpleasant symptoms have been entirely arrested, so that we have every reason to believe that the operation, even in so complicated a case, will result in cure.

It must be remembered, however, that this operation is not always a feasible one; that the ovaries and tubes may frequently be so adherent, so spread over the surface of a fibroid, and so surrounded by vascular structures as to render their removal impossible. In such cases, or where the tumor is very large and made up of a number of growths, the preferable plan of procedure is that known as supra-vaginal hysterectomy. In cases in which the growths are of the subperitoneal variety, with more or less definitely formed pedicle, the operation of myomectomy may be done. This consists of cutting off the growth from the uterus, and may be done by the formation of flaps, which are brought together by sutures, so that the raw surface is completely covered by the peritoneum.

In operations for the removal of the body of the uterus, the application of the clamp has long been recognized as the preferable plan of procedure. Numerous attempts have been made to accomplish the operation and drop the stump back, but as this tissue is so erectile that it may readily give rise to subsequent hemorrhage from the slipping or loosening of the ligature about the stump, the extra-peritoneal treatment has proven the more satisfactory. The growth is raised up and an elastic ligature thrown about the stump and the mass cut away. The stump is transfixed with long pins, beneath which the *serre-nœud* is applied and drawn tight. The elastic ligature is now removed, the parietal peritoneum sewed fast to that of the stump beneath the wire of the *serre-nœud*, the stump having been previously pushed firmly down into the lower angle of the wound. In this way the peritoneal surfaces are firmly glued together, interfering with any leakage into the abdominal cavity. The abdominal wound above is closed by sutures, and carefully dressed, as in any other abdominal operation. It is im-

portant, however, to surround the stump with a separate dressing, so that any discharge that may take place from it will be absorbed by this dressing without coming in contact with any portion of the wound. The drying up of the stump may be promoted by painting it with Monsell's solution, or rubbing into it an acid sublimate tablet. The superfluous material of the stump, of course, should have been previously cut away, so as to leave as little externally to dry and decompose as will be necessary for the purpose of retaining it in position. The disadvantages of treating the stump outside of its cavity are the subsequent retraction and depression of the abdomen at this point, the long-continued convalescence requiring a portion of the wound to heal and fill up by granulation, and the weakened ventrum increasing the tendency to the development of hernia. These disadvantages, however, are compensated by the lessened mortality and the decreased danger of hemorrhage. A certain method of controlling hemorrhage by which the stump can be safely dropped back into the peritoneal cavity will be, however, a very welcome addition to this operation.

Unless we are particularly careful in the choice of cases subjected to the operation of supra-vaginal hysterectomy, and decline to operate upon the doubtful, the mortality must necessarily be larger than for ovarian growths of a similar size and duration.

[The case under consideration was operated upon on December 13, 1890. Owing to the presence of albumen and some pus in the urine, she was given the A.-C.-E. (alcohol, chloroform, and ether) mixture as an anæsthetic. The operation was performed for the removal of the mass. To accomplish this it was necessary to enucleate it from the broad ligament on either side. After its removal the ligaments were brought together in such a way as to shut off the pelvis from the abdomen above, and into this space, owing to some oozing, a drainage-tube was inserted.

The patient bore the operation well, the pulse being fully as strong at its completion as at its beginning. She was doing well on the following day, until in the afternoon, when she became quite violently delirious, and soon died.

An autopsy disclosed the fact that both ureters were dilated, one to the size of the finger; both kidneys were sacculated and their cavities filled with pus. The presence of pus and albumen in the urine led me to fear such a condition, but I hoped that the pressure might have been more particularly upon one ureter with the destruction of the corresponding kidney, and that there might have been a possible escape of the other, and a sufficiently healthy condition of it to permit of the patient's recovery from the operation.]

THE TREATMENT OF DISPLACEMENTS AND OF FLEXIONS OF THE UTERUS.

WRITTEN ESPECIALLY FOR "INTERNATIONAL CLINICS."

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General Considerations.—Accurate diagnosis must precede rational therapeutics. To appreciate properly deviations from the normal an exact understanding must be had as to what constitutes the normal. What, therefore, is the normal position of the uterus? In the nullipara the organ floats, as it were, in the pelvis. Its position in the majority of instances is one of slight antecurvature. It is movable to a variable degree in all directions, the sphere of motion being checked by the folds of the peritoneum which laterally go to form the broad ligaments, anteriorly are reflected on to the bladder, and posteriorly pass to the sacrum and the rectum. The condition of the adjacent organs influences markedly the position of the uterus. When the bladder is distended the uterus is carried upward and backward, the antecurvature for the time being disappearing. When the rectum is filled the uterus is carried upward and forward. Such, within physiological limits, is the range of motion of the nulliparous organ. Deviation from these limits gives rise to symptoms and the picture is altered to the pathological. It by no means, however, holds true that in a given case position of the uterus other than one of slight antecurvature is pathological. Deviations from this rule are not uncommon without concomitance of symptoms. Broadly, then, it may be stated that that position alone is pathological which gives rise to symptoms. Every retroversion does not call for mechanical or surgical treatment, neither does every flexion.

In the multipara the position of the uterus may be most varied. Even where the tonicity of the pelvic floor has been but slightly im-

paired during parturition, the increased weight of the parous over the nulliparous uterus necessarily entails more or less sagging of the organ. Chiefly, then, and broadly, it is the degree of sagging of the organ in the multipara which gives rise to symptoms and constitutes a displacement.

Varieties of Displacement and of Flexion.—From what has preceded it is apparent that the uterus may be displaced in the vertical or in the horizontal plane. The vertical displacements are known as anteversion or retroversion, accordingly as the fundus lies anteriorly or posteriorly. The displacements in the horizontal plane are those of ascent or of descent of the organ or of lateral position. Ascent of the uterus is physiological within limits. Descent of the organ is pathological when it occurs to a sufficient degree to give rise to symptoms, either through pressure on the pelvic nerves or through traction exerted on the neighboring organs.

Anterior and posterior displacements are further subdivided into antelexion or retroflexion according as the angle of flexion is associated with position of the body of the uterus, backward or forward. As will be seen farther on, it is not so much the degree of flexion which produces symptoms as the associated changes in the endometrium, or the sagging of the uterus.

The treatment of uterine displacements is either *mechanical* or *surgical*, according to the demands of the individual case.

Mechanical Treatment.—This consists in resort to the tampon, the pessary, or to both. The tampon is mainly of value in the treatment of adherent uterine displacements. Its aim is palliation, and not cure. By maintaining the uterus at a slightly higher level in the pelvis, the strain on the uterine supports is in a measure relieved and the periuterine circulation becomes free. It has been asserted, and it is still the belief of many, that by means of the persistent vaginal tamponade adhesions may be stretched and the uterus become movable. The truth of this assertion I very much doubt. In instances where, as the result of the tamponade, the sphere of motion of the adherent uterus is increased, on careful examination this will be found to be due to the fact that not alone has the uterus been raised but the organs as well to which it is adherent. I look upon the tampon, then, simply as a palliative. It acts as a splint, and in so far the patient's subjective symptoms are improved.

To accomplish even this much the tampon must be properly applied. Simply to crowd cotton or wool into the vagina will not answer the purpose. Care must be taken not to push the uterus too far upward, for then, obviously, the same measure of strain exists, only in an

opposite direction, as before the insertion of the tampon. The true test of the proper application of the agent is the patient's sensation. If, when the vagina has been tamponed with the patient occupying the knee-chest or the left-lateral position, she experiences some relief, then and then only has the agent been properly applied or may it be depended on as possessing any value.

A point to be remembered here, as also in the use of the pessary, is the absolute necessity of removing every cause of uterine congestion coincidently with the employment of the tampon. Chronic constipation, pressure by corsets, the abuse of the sewing-machine, these are factors which add to the symptoms associated with uterine displacements.

The subject of pessaries may be very much simplified. Of the thousand and one which have been invented there are but one or two varieties which possess any special value. Considering, as the writer does, that the symptoms accompanying an uncomplicated uterine displacement are due to the degree of downward sagging of the organ, an instrument which will correct this sagging is all the practitioner need search for in order to cure, as far as he may, his patient. There are two instruments which, in the hands of the writer, will answer for every case at all suitable for the application of the pessary. These are the Albert Smith and the Fowler. These instruments, whether the displacement be ante or retro, act beneficially simply by holding the uterus at a higher level in the pelvis, relieving the strain on the uterine supports or the adjacent organs. The cardinal rules to bear in mind before inserting any pessary are: the uterus must be movable, and the uterus must be replaced before inserting the instrument. It is as irrational to insert a pessary into the vagina before replacing the uterus as it would be to apply a splint to a fractured bone before bringing the fragments into apposition. Furthermore, whatever pessary is used, it should not interfere with the normal range of motion of the uterus, or make undue pressure on any of the adjacent organs. Where the uterine displacement is associated with sagging of the ovary or ovaries, if these organs are not adherent, they may be replaced with the uterus, and then the Albert Smith pessary, with a thickened posterior bar (the Thomas retroversion pessary), may prevent the redescend of the ovaries by filling the posterior vaginal cul-de-sac.

Obviously, in order to sanction the insertion of any form of pessary the pelvic floor must be present in its integrity. In instances where the displacement of the uterus is associated with lesion of this floor one or another of the operations devised for the repair of the lesion must precede the insertion of the pessary.

Thus far only uncomplicated *versions* of the uterus have been spoken of. When we pass to *flexions* of the organ we touch on very debatable ground. The writer's own views are the following : Flexion *per se* does not give rise to symptoms. The imperfect drainage which is usually associated with the flexion is the real source of the symptoms, and it is therefore the endometritis, which is the natural result of the lack of drainage, which we are called upon to treat in order to cure, it may be the dysmenorrhœa, it may be the sterility. The methods at our disposal may fairly be termed surgical, and this question is simply broached here because in natural sequence the *stem* pessary must be referred to. This instrument, whether it be termed a pessary or a drainage-tube, we would relegate to the class of instruments which should not be used. As will be noted further on, drainage may be obtained in as efficient a way otherwise ; and if used as a pessary in the true sense of the word, the endometritis, which it is our chief aim to cure, is apt to be intensified by the insertion and the wearing of what, from its very nature, can only be a direct irritant to the uterus. This remark is applicable with equal force to any other device intended to be worn in the cervical canal, whether for the relief of dysmenorrhœa or of sterility.

From what has preceded, it is apparent that by the writer the pessary is viewed purely as a palliative. As a curative agent far too much has been claimed for it. Given an instance where the real cause of the symptoms is the endometritis which, through congestion of the uterus, causes the sagging, then the wearing of a pessary may result in ultimate cure. But here the real reason for the cure is the disappearance of the endometritis, for this may be effectually obtained without intra-uterine applications in case of the simple catarrhal form of endometritis. The simple equalization of the pelvic circulation obtained through the maintenance by the pessary of the uterus at a normal level in the pelvis will usually result in cure of the endometritis, and consequently in lessened sagging of the organ. Where, however, the displacement of the uterus has resulted from loss of tone in its normal supports, it is questionable if by any variety of pessary we can do more than palliate. Seeing, however, that a properly-applied and properly-watched pessary can do no damage to the patient, we possess in the agent a most valuable means of palliation in instances where operative means are not called for or are not desired.

In connection with the mechanical treatment of uterine displacements, it is necessary to refer briefly to the subjects of massage and of electricity.

Massage, in the hands of its chief advocate, Thüre Brandt, has unquestionably yielded good results not only in uncomplicated cases, but also in the presence of adhesions. It is noteworthy, however, that the method has but few adherents outside of the land of its origin. It is conceivable that by means of careful massage the periuterine circulation may be improved, and in so far the uterine. We thus may acquire lessened weight of the organ and lessened sagging; but, in view of the fact that the chief supports of the uterus are not muscular, it is not apparent how massage is able to restore tone to these supports. Where the displacement is accompanied by adhesions the safe rule is not to use massage. Current pelvic pathology teaches that these adhesions are almost uniformly the result of a pyosalpinx or ovarian abscess. Efforts then at loosening adhesions by manipulation carry risk in that the pus-collection may be caused to rupture and the patient's local condition in so far be made worse. These remarks are equally applicable to Schultze's method of forcibly loosening adhesions. Indeed, in general, it may be stated that cases of displacement with adhesions, where palliation through the tampon is impossible or inadvisable, properly demand surgical means, to be presently referred to.

As regards electricity, from a fairly extensive experience the writer can state that the cure of displacement by this means is very problematical. Where the displacement is due simply to an endometritis, electricity (galvanism) is of decided value, since the endometrium may be thus rendered healthy. Where, however, the displacement follows loss of tone in the uterine supports, neither galvanism nor faradism has proved of the slightest utility. Displacements with adhesions, on the other hand, may often be benefited through resort to electricity. Equalization of the periuterine circulation is attained in a measure through galvanism, and sedation is reached through bipolar vaginal faradization. The ultimate result, however, is only palliation. Cure is not thus obtainable.

In case of *flexion* the result is different. Negative electrolysis of the canal with a current of from five to eight milliamperes secures patency and drainage, and then positive galvanization with a current of thirty milliamperes will usually cure the associated endometritis. Instances of flexion unassociated with pelvic inflammatory disease are alone included in this statement. Where disease of the appendages or of the pelvic peritoneum exists concomitantly with the flexion, then, the source of the symptoms being a mixed one, electricity can only palliate.

Operative Treatment.—A non-adherent displaced uterus rarely

calls for operative interference. If the endometritis which may be associated with the displacement be cured, if extraneous sources of pelvic and uterine congestion be removed, then, in the vast majority of instances, a symptomatic cure of the displacement may be obtained through the insertion of a suitable pessary. Where the displacement is accompanied by lesion of the pelvic floor or of the cervix, this must be repaired, of course, before the case is pronounced intractable to relief by means of the pessary.

It will be convenient to speak of the operative treatment of flexion and of adherent uterine displacement separately.

Surgical interference in case of uterine flexion is called for either on account of dysmenorrhœa or of sterility. As already stated, dysmenorrhœa, when of uterine origin, is dependent on an existing endometritis. If this endometritis be cured, then, in so far as the flexion is concerned, the dysmenorrhœa is also cured. The current method of overcoming flexion is by the resort to *divulsion*. We thus make the cervical canal patent, securing drainage and the ability to treat properly the diseased endometrium, either by the curette and caustics or by the latter alone. This patency of the canal may be secured either through recourse to the hard rubber cervical dilators, or the steel-branched instruments. The former is a slow method, and applicable in particular to patients who for one or another reason object to anæsthesia. The latter method is preferable in that it is quicker. Anæsthesia is requisite, and rest in bed for a number of days thereafter should be stringently insisted upon. The contraindications are inflammatory conditions of the pelvic peritoneum or disease of the uterine appendages. The divulsion should be thorough, the object being to paralyze the muscles in order to avoid tendency to recontraction. It is the custom of many gynecologists to insert a stem pessary after divulsion; for reasons stated, I do not approve of this practice. Ample drainage may be secured by means of a strip of iodoform gauze carried to the fundus. This gauze should be changed every few days up to the menstrual period following the operation.

Passing now to the consideration of the operative treatment of displacement, the method resorted to will vary according to whether the uterus is adherent or not. In case of the non-adherent uterus, where non-surgical measures fail to relieve, a number of operations have been resorted to with varying success. An old method, lately rejuvenated by Herrick, of Michigan, is attachment of the portio vaginalis to the posterior vaginal cul-de-sac. This is accomplished by denudation of the posterior surface of the cervix and of the vaginal wall close to its

reflection on the cervix. By means of deep sutures union may be secured and the fundus of the uterus is maintained anteriorly. It is very questionable, however, if by this method the sagging of the uterus—the prime source of the symptoms—can be relieved.

Another method suitable for the cure of non-adherent uterine displacement is the operation of shortening the round ligaments by incision along the inguinal canal. Opinion differs markedly as to the ultimate value of this operation. It would seem to be the ideal method in that the uterus is thus lifted not only forward but also upward, and where the ligaments can be found and are not atrophied this method may be resorted to with fair hope of cure. A *sine qua non*, however, in addition to movability of the uterus, is that the perineal floor should be made intact in case it has suffered injury.

A third method, recently proposed by Krug, of New York, and in his hands successful, is what he terms *transperitoneal hysterorrhaphy*. The steps of the operation are the following: The patient is placed in Trendelenburg's position, in order that the intestines may gravitate upward, the bladder is carefully emptied, and the uterus is thoroughly anteverted against the abdominal wall. An incision three-quarters of an inch in length is made *down to the peritoneum* just above the symphysis of the pubis. A Peaslee-Hagedorn needle, with roughened posterior edge, is inserted through the abdominal wall and peritoneum. The cutting edge, on the back of the needle, is made to denude about a quarter of an inch on the anterior surface of the uterus. The needle is then passed through the uterine tissue and emerges through the abdominal wall on the opposite side. It is threaded with silkworm-gut and withdrawn. A second suture is passed in a similar manner, and ordinarily these suffice to close the wound in the abdomen. The patient is kept in bed for a fortnight, and the sutures are withdrawn in from four to six weeks. The uterus will then be found firmly adherent to the anterior wall of the abdomen.

This operation commends itself to our judgment in that it avoids opening the peritoneal cavity. It is very questionable, indeed, if the latter step is justifiable for the relief of symptoms due to a non-adherent retroverted or retroflexed uterus. While it is granted that nowadays opening the peritoneal cavity is practically *per se* almost free from risk, still there is risk, and in the absence of strict indication to the contrary the judicious surgeon will not subject his patient to it.

The surgical methods applicable to the relief of an adherent uterus are similar to those called for in case of disease of the appendages intractable to other methods of treatment. Adhesion of the

uterus means almost uniformly pelvic peritonitis, and this peritonitis is ordinarily secondary to disease of the tubes or ovaries or both. In such instances it is very difficult to determine whether the symptoms are due to the displacement or to the disease of the appendages. The pessary is here contraindicated, for the reason that the uterus cannot be replaced; the tampon is purely palliative; electricity at times yields a symptomatic cure, but only this. To obtain an anatomical cure the peritoneal cavity must be invaded, the adhesions broken up, and then the uterus may be suspended by one or another of the methods to be shortly referred to. True enough, after these operative steps the patients will frequently complain that they have not been bettered. They are the victims of pelvic neuralgia, frequently of an excruciating type, possibly dependent on injury to nerves, possibly on the formation of new adhesions consequent on the trauma associated with loosening the old. Still, up to the present, where the case is one of pyosalpinx or ovarian abscess, the only method at the surgeon's disposal for rectifying the malposition of the uterus is resort to the steps just outlined.

The uterus having been freed from its bed of adhesions and the appendages removed, the operation of most promise, as regards ultimate result in rectifying the uterine displacement, is the following: Two or more strands of silk-worm-gut are passed through the uterine cornua from each side of the abdominal incision. When tied, the uterus is held close against the abdominal wall, and if union takes place the organ is not likely to sink backward and downward again. This is particularly the case seeing that, the appendages having been removed, the uterus undergoes senile involution and in so far becomes lighter.

In instances where the strict indication is not to remove the appendages, the sutures, instead of being passed through the uterine cornua, may include only the round ligaments; or else these ligaments may be denuded, folded on themselves, and each fold sutured and thus shortened,—a method proposed by Wylie, of New York.

It goes without saying that the strictest antisepsis should accompany each of these operative procedures.

MYOMA COMPLICATING PREGNANCY; LACERATION OF THE CERVIX AND RETROVERSION; CHRONIC ENDOMETRITIS AND SALPINGITIS.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC.

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MYOMA COMPLICATING PREGNANCY.

THIS patient is thirty years of age; has been married about twelve years, and has had six children, the last about eight months ago. She is now nursing. She was unwell about three weeks ago. At present she complains of a good deal of pain in the back and right side of the abdomen, which has been marked since the birth of the child. This patient came to me first some three weeks ago, and I found a condition which induced me to tell her that she should be kept under observation for several months. My reason for telling her this was that, on examination, I felt not only a lacerated cervix of the third degree, which was probably of no consequence in this case, but I found, on investigating the cause of pain on the right side, a large and more or less distinct mass, which was apparently firmly connected with the uterus, and not very movable except with this organ. It felt either like a multilocular ovarian tumor, which is often quite hard, or else like one of those growths springing from the uterus, known as fibro-myomata. The latter are composed partly of fibrous, and partly of muscular tissue, are not very hard growths like the fibromata, nor very soft ones like the myomata, but a combination of the two.

The semi-elastic feel of this tumor, its anatomical relation to the uterus, the fact that it gives rise to pain, and the possibility that this

woman might have a foetus in the other half of a bicornate uterus, made me tell her that she should be kept under observation until I could see whether the tumor were growing, or diminishing, as a myoma should do after confinement. The delivery of a full-term foetus from one half would not necessarily cause a miscarriage from the other, and therefore the uterus might continue to increase in size. In this case, however, the child was born eight months ago, and the size of the right half of the uterus does not correspond with an eight months' pregnancy. The size of the tumor on the right side would not indicate more than a four months' pregnancy. The possibility of such a condition occurred to me, because about two years ago a patient was brought into the hospital with a diagnosis of extra-uterine pregnancy of four months. She had a great deal of pain in the right side, and the tumor was found to correspond almost identically with the tumor in this case, in size, hardness, and tenderness. I thought there was no question about the existence of extra-uterine pregnancy, as she had skipped four menstrual periods, and had nausea and other signs of pregnancy. The sound passed in three inches, but it did not go up into the tumor, and hence indicated not a uterine but an extra-uterine pregnancy. I thought it a tubal pregnancy very closely connected with the body of the uterus. She had much intermittent and severe pain. I performed laparotomy, and, on exposing the uterus and passing my hand into the abdominal cavity, was very much surprised to find that the peculiar projecting tumor springing from the right side of the uterine body was no longer to be clearly felt. The uterus was of uniform size, and had a very broad fundus. I told my partner, Dr. Wells, to pass the sound into the uterus, and it passed just as I had passed it; but on again inserting it more towards the right, it went in a long distance, to the very fundus, and the diagnosis was at once plain,—it was a bicornate uterus. It was very fortunate that I had not cut into the uterus, emptied its cavity, and extracted the foetus, as I had at first intended to do, thinking it might be an interstitial pregnancy. Before this I had aspirated and found amniotic fluid, and on bringing the uterus out of the abdominal cavity, the true nature of the case became apparent. Of course the woman should have been left alone. She had had one child already, and the cervix was torn on one side. Having removed some of the amniotic fluid, I knew abortion would occur. There was a slight rent in the peritoneal covering of the uterus from catching it with vulsellum forceps before the diagnosis was established; so I sewed this with catgut, and, when the bleeding had entirely stopped, returned the uterus to the abdominal

cavity, and sewed up the incision. She aborted that night, and made a perfectly uneventful recovery. This was the first time I had been misled in this way, and the case closely resembles the one now before us, except that this woman gives no signs of pregnancy. I have no question in my own mind that this is a myoma springing from the wall of the uterus, being partly subperitoneal and partly interstitial. Usually such myomata do not cause pain, and after confinement diminish in size, sometimes disappearing entirely during the natural process of involution. This is not the case here, because eight months have already elapsed, and the tumor is quite large. The sound shows the uterus to be only three inches in depth. The case is also interesting on account of the coexistence of pregnancy and a fibroid or myomatous growth in the uterus. I have seen a number of such cases, where either interstitial, subperitoneal, or pediculated fibroids, hanging more or less loosely from the body of the uterus, have been present in cases of pregnancy going on to full term, the fibroid increasing very rapidly in size in consequence of the natural increase of the uterus. Labor may go on without any interruption, and the patient make a perfectly normal recovery, the fibroid diminishing greatly in size, or even entirely disappearing after confinement. Occasionally you will meet with cases where a myoma, usually an interstitial one, impinges more or less on the uterine cavity, causing uterine contractions, and, of course, either abortion or premature labor. If the fibroid or myoma should be submucous, and impinge directly upon the cavity of the uterus, the chances are that the woman would abort anyway, because such tumors give rise to bleeding. In fact, one of their prominent symptoms is menorrhagia. If a woman should become pregnant with a tumor situated in this way, she would probably miscarry very early. This is not invariably the case, however, for women have sometimes gone on to full term, and the tumor has sloughed away as the result of the compression produced by the uterine contractions, and the pressure of the child, the tumor coming away after the delivery of the child and after-birth, much to the surprise of the attending physician.

There is one danger to fear from interstitial and submucous fibroids if the woman goes to term, particularly if they are situated near the fundus uteri, and that is, post-partum hemorrhage. I have seen several cases of frightful post-partum hemorrhage, where I found a tumor projecting at the site of the placenta. Its presence interfered with the contraction of the uterine body, and the blood-vessels at the placental site were not compressed sufficiently to stop the bleeding. In

such cases, the best method of treatment is direct bi-manual compression, with one hand in the uterus and the other on the fundus, together with hypodermics of ergot into the abdominal wall. Of course, ice may be introduced into the uterus, and injections of ice-water and vinegar, or *hot* water and vinegar. The faradic current may also be used. I said either *iced* water or *hot* water and vinegar, because heat and cold act alike in controlling hemorrhage. My preference is usually for cold, as it always has the same temperature, while hot water may be either too hot or not quite hot enough. The hæmostatic effect of heat is, I think, also not so permanent as that of cold.

What shall we do with this woman's tumor? She has pain, but she does not menstruate profusely, and hence there is no need to pay attention to the common symptom of fibroids,—menorrhagia. We cannot, however, do much for her. If she were in good circumstances, she would be benefited a good deal, as regards the diminution of pain and reduction in the size of the tumor, by the Apostoli method of galvanism, using the positive pole in the uterus, and the other electrode, consisting of clay, or of a large, flat sponge covered with a quilted sand-bag, upon the abdomen. A current of one hundred to two hundred and fifty milliamperes for five or ten minutes, two or three times a week, for twenty-five or thirty sittings, would probably yield good results. I have had some excellent results, and some most dismal failures, by this method of treatment; but this criticism applies to every treatment which is not a specific. This patient's symptoms are not very severe. We shall therefore keep her under observation to watch the growth or diminution of the tumor. The pain can be relieved by local applications like chloroform liniment; but the relief to her mind, by telling her that the tumor is of no consequence, will do her much more good. She came to me after being told by one of the house-staff of the Woman's Hospital that she had a tumor requiring immediate removal. At least, that is her statement. I think the removal of such a tumor would have been very difficult; for it would require a large incision into the capsule of the tumor, which must be peeled out, and the capsule then sewed up. This operation of myomectomy, or enucleation by laparotomy of interstitial fibroid or myomatous growths, is a very successful operation, but is not by any means an easy one, and it should be reserved for cases justifying the employment of severe measures. This patient undoubtedly had the tumor during her last pregnancy, for such fibroids do not usually grow in five or six months. As a general rule, the harder the tumor and the more subperitoneal, the less likely is it to increase in size.

LACERATION OF THE CERVIX AND RETROVERSION.

This next patient is thirty years of age ; married, and has had three children and one miscarriage, the latter having occurred ten weeks ago. She had a uterine flow for six or seven weeks after this. Now she comes here for pains which she feels all through the lower part of the abdomen, with pain in the back, and "bearing down." The symptoms are those very commonly met with in minor cases of uterine disease, such as chronic endometritis, chronic cervical catarrh, retroversion, and downward displacement, generally with a heavy subinvolved uterus. That peculiar "burning" sensation which you hear women tell about is really a sensation of heat or throbbing. It is very often due to constipation, and will usually disappear under the administration of cathartics. This woman's cervix presents a very common condition, which sometimes causes no symptoms, while in other cases it produces very severe local and reflex symptoms. On digital examination, we find two pathological conditions which partly account for her pains, viz., a deep bilateral laceration of the cervix extending up very nearly to the vaginal vault, and a retroversion of the uterus between the first and second degrees, the fundus lying upon the rectum. The external os gapes, and admits the finger to the very depth of the laceration. This second pathological condition will account for her backache. The cervical laceration certainly is large enough to require repair, and the backward displacement ought assuredly to be relieved, and the uterus kept in position by means of a supporter, usually a modification of the Hodge pessary, known as the Albert Smith. The point to be decided before doing this is, whether such replacement be possible. To do this, pass your finger into the posterior vaginal vault, and ascertain the mobility of the uterus. If you cannot replace the organ with the patient in the dorsal position, try it with her on the side, pushing up the fundus with two fingers of your right hand. Having replaced the uterus manually, insert the pessary. If the uterus be found adherent to the anterior wall of the rectum, as is not infrequently the case, owing to peritoneal adhesions, it may be restored gradually to proper position by the systematic use of tampons for months, or by rapid elevation with the repositor. Here I find the uterus perfectly movable, and I can push my hand upon the abdomen behind it, and easily restore the organ to its normal position ; hence, there is no obstacle to the immediate introduction of a supporter in this case. Now, having replaced the uterus, I examine the appendages. I find the left ovary quite close to the

cervix, but perfectly normal in size and outline. The right ovary is likewise perfectly normal in size,—i.e., about the size of an unshelled almond. This combination of laceration of the cervix with backward displacement of the uterus is met with almost daily. The correlation between the laceration of the cervix and the displacement is not so distant as one might imagine. The first effect of such a laceration upon the uterus, if it be sufficiently extensive, is to interfere with the function of involution, causing the uterus to remain large and heavy. As a result, particularly if the woman be multiparous, so that the pelvic organs have been already relaxed, the heavy uterus will drop back, giving rise to retroversion, and perhaps ultimately becoming a retroflexion. I presume this patient's symptoms will be greatly relieved by lifting up the uterus into position, and inserting a supporter. These supporters are unpleasant, but I know of no way in which I can keep a displaced uterus in position and allow the woman to go about her work, except by some intravaginal support. Of course it must be properly fitted to each individual case, and she must be occasionally examined. A pessary must be worn some months, and, in some cases, for years; but when properly applied, it gives very little inconvenience, the patient does not have to see her physician but once every few months, and hence the advantages more than counterbalance the disadvantages and discomfort. There is much said about pessaries being "bad instruments." In my experience, they do harm because they are not properly applied, or properly watched. It takes a great deal of technical skill, and some judgment, to use them successfully. An ill-fitting pessary is even worse than an ill-fitting shoe.

Placing the patient in the Sims position, and examining with the speculum, we find that the laceration seems smaller than it did on digital examination. This is because the parts were in the natural position during the digital examination; but the speculum pulls the perineum backward, the anterior vaginal wall is pushed forward by the depressor, and the pulling apart in this way of the lips of the cervix makes the laceration appear more shallow. Hence, never make a diagnosis of any uterine or cervical pathological condition with a speculum or finger alone. Usually the digital examination should come first.

Now, which condition should be attended to first? If a supporter be introduced, as the woman stands on her feet, the cervix comes down between the bars of the pessary, and causes a steadily increasing eversion of its lips, just as in the speculum examination. If the cervix be first sewed up, it will be one or two months before the pessary can be introduced, because, if inserted sooner, it will probably tear apart the

freshly-united edges of the cervical tear. Usually the symptoms of displacement cause more discomfort to the patient than the lacerated cervix, and on that account I would keep the uterus in position for one or two months by a properly fitting pessary, allowing the patient to go about all the time. I would then sew up the tear, keeping her in bed for about two weeks, after which the uterus will probably be in normal position as a result of the operation and the rest in bed. After being out of bed for a month or six weeks, if the uterus be out of position, the pessary should be again inserted. In that way we can always cure these cases if we are able to secure the proper co-operation of the patient.

CHRONIC ENDOMETRITIS AND SALPINGITIS.

Our next patient is twenty-seven years old; has been married ten years, but has had no children. She menstruates every three weeks, and the flow, which is normal in amount, lasts six or seven days, and is accompanied by considerable pain. She complains of constant pain in the left ovarian region. There is a profuse yellowish, sticky, vaginal discharge. She desires to know the reason for her sterility. The discharge you see on my finger is such as you would expect to get either from the vagina, as a result of subacute catarrh of the vagina, or from the uterus, as a result of a subacute or chronic endometritis. In this case the condition is undoubtedly chronic. If the discharge were from the cervix it would be thick and stringy, and could be drawn out into shreds several inches long; but this peculiar purulent discharge is usually a sign of chronic endometritis, a sufficient cause for her sterility. It is certainly one of the common causes; for the purulent discharge interferes with the life of the spermatozoa, although they may enter the uterus. But this is not all; the finger detects a nodular, irregular cervix with a gaping external os, a very unusual condition for a nulliparous woman. Bimanual examination shows a distinct swelling on the left side larger than an egg, tubular, and freely movable. It is undoubtedly the left ovary and tube, the latter considerably distended, probably with fluid. On the right side the ovary and tube are not enlarged, but are adherent. The uterus is not freely movable, and the attempt to move it causes considerable pain. This is a typical case of chronic endometritis with probable purulent salpingitis on both sides, with enlargement of the left and adhesions of the right ovary and tube. These conditions are often attributed to gonorrhœa, chiefly of the latent variety, because men with acute gonorrhœa do not usually indulge in sexual intercourse. It has been claimed by Noeggerath and others that a man is never really cured of a gonorrhœa, and always infects

sooner or later any woman with whom he may have intercourse. This is true of a certain proportion, but it is not true in my experience for a majority of the cases; for there would scarcely be a healthy woman in the land if such were the case.

This patient may have been infected by her husband, but it is quite as likely that she had originally an acute endometritis from imprudence during menstruation, excessive coition, exposure to cold, or from some traumatism. When the disease is of long standing, as in this case,—four years,—it is of but little importance whether it be caused by gonorrhœa or by the other causes already mentioned. I think that not much can be done for this woman's sterility. If she had not adherent ovaries and salpingitis, we might cure the endometritis, but as it is now, if we adopt *effective* treatment for the endometritis, which is necessarily pretty severe, we shall in all probability only increase the inflammatory condition of the annexa. By scraping out the uterus with a sharp curette and thoroughly applying a fifty per cent. solution of chloride of zinc to the whole endometrium, and repeating these applications once in a week or ten days, the endometrium might be restored to a normal condition; but those applications would more than likely excite fresh inflammation of the appendages, and leave her in a worse condition than before. We might try to cure the disease of the appendages by the use of iodine and tampons, warm sitz-baths, etc., but the treatment is exceedingly tedious, and is seldom continued long enough to secure any marked benefit. A private patient, who came to me recently with a sharp ante flexion, decided enlargement of the left tube, and with a uterus not very movable, was sterile, and was urgently desirous of having children. Under an anæsthetic, I employed the following method, well knowing the risks. A fine probe-pointed knife was passed through the internal os, which was slit in four directions, so as to admit of the passage of a large Peaslee sound. I did not dilate for fear of causing a return of the salpingitis and local peritonitis. After swabbing out the uterine cavity with a solution of equal parts of carbolic acid and glycerin, I inserted a stem pessary into the uterus. The stem was removed two or three times within a fortnight, and the carbolic acid again applied before its reinsertion. An ice-bag was applied over the abdomen after every such application to avoid peritonitis. The patient returned to her home in Texas rather prematurely, but there were no bad effects, and her physician wrote me that she was doing well. It is too early to say whether or not she will conceive. I have seen conception occur, however, when the tubes and ovaries felt more diseased than in the case to which reference has just been made.

REMOVAL OF TUBES AND OVARIES; ACQUIRED ANTEFLEXION OF THE UTERUS; VENTRAL FIXATION OF THE UTERUS.

CLINICAL LECTURE DELIVERED AT THE LONG ISLAND COLLEGE HOSPITAL.

BY ALEXANDER J. C. SKENE, M.D.,

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REMOVAL OF TUBES AND OVARIES.

GENTLEMEN,—The first case which I present to you to-day is that of a woman, twenty-eight years of age, who has had pelvic pains and dysmenorrhœa since puberty, and at her menstrual periods has been compelled to remain in bed for four or five days, though able to be about at other times. She says that she has taken almost everything in the way of medicine to relieve the pain, but has not had hypodermic injections of morphine. Only once or twice has she taken this drug, but it did not relieve her. She has been under the care of a physician since she was nineteen years old,—that is, for a period of nine years,—and was treated surgically three years ago, and since then by a gynæcologist, and all without benefit. On the 27th of March last, both ovaries with the tubes were removed. In two weeks and three days after the operation she sat up. On leaving the hospital she still had the pains; and she says they were just the same in character the moment she was on her feet, and were much more severe than before. Recently she has had less pain, but is never entirely free from it. The pain is worse when she gets over-tired. She has not menstruated since the operation.

She says that for the first four or five months after the operation she kept account of the time at which she ought to menstruate, but could not notice that the pain was any worse at that period.

At no time since the operation has she had anything like the pain she used to experience at the menstrual period. She is relieved from pain when she lies down, and does not suffer from headache as before. She has given up taking medicines since the operation.

Here is a very interesting case, because it illustrates an exceedingly important point with reference to the removal of the ovaries and tubes. You know that this removal of the ovaries and tubes has become a recognized treatment for various morbid conditions. It is spoken of in our journals and books as the removal of the uterine appendages. I object to the term "appendages." I think that the ovaries and the tubes are just as important as the uterus; in fact, if I were to use the term "appendage" at all, I should apply it to the uterus, because in the evolution of living beings this organ is added to the ovaries and tubes. The reproductive organs of many of the lower animals consist, as in the bird, for example, of ovary and oviduct, with no uterus at all. In the higher orders the uterus is added. Hence my objection to placing the ovaries and tubes in any such subordinate position. That is a question of terms, however, which you may settle according to your liking. I wish you clearly to understand the conditions which call for the operation which this patient had done for her relief.

First. The ovaries and tubes should be removed when they are diseased and when general and local treatment of a less heroic character fails to relieve the difficulty.

Second. When the presence of normal ovaries causes or keeps up other affections, certain neuroses and dysmenorrhœa for example, which are otherwise incurable.

Third. To produce a premature menopause for the purpose of arresting the growth of uterine fibromata.

Here then are the conditions for the relief of which the removal of these organs has been practised when they are diseased, or when, though not diseased, their presence presumably keeps up or permits marked disturbances not otherwise curable.

Now, the question is, do we always succeed in curing our patients if we remove the ovaries for such indications? It is a fact that we do not. Removal of ovaries and tubes when they are diseased is generally successful, oftentimes surprisingly so; but when removed to cure affections of other organs, failures are quite common.

This fact leads us to be exceedingly cautious in deciding to operate. The patient before us is relieved of her painful menstruation. She menstruates no more, but she still suffers very greatly, and is far from well. But one may say that the time which has elapsed since the operation is not long enough for complete recovery. The rule, according to my observations, is that if relief does not come soon after operating it does not come at all. Sometimes you will see a patient that is fairly well after it; but in time the pain comes back again. The cause of this

suffering may be twofold. First, painful stumps may exist. When an ovary is removed the stump that is formed is apt to be tender and painful, just as in the case of an amputated limb.

Again, the ovaries and tubes have often become adherent from pelvic peritonitis, and these adhesions, which must be broken up in operating, recur during recovery and cause pain.

These are the common sources of pain, and we have still another, illustrated in this patient, who is at a time of life when she ought to menstruate. If you arrest the menstrual function at this age you upset the whole economy, and the nervous system suffers in consequence. It is impossible to produce the menopause at twenty-eight without some disturbance following. You impair the general health and do more or less harm in the majority of cases. Consequently, you are never justified in removing the ovaries to cure a morbid condition outside of the ovaries themselves, unless you have the very best of reasons for believing that the patient will, if left alone, certainly die or go mad. Then the operation may be justifiable, provided you have exhausted every other means.

The point I wish you to carry with you is this: Here is a living illustration of the fact that the operation is to a certain extent a failure. It may be that in the journals throughout the country to-day this case is being read about as one of the successful ones. It was successful so far as the operation was concerned; the patient lived; the operation did not produce death; but the results desired and expected from that operation have been to a large extent, you see, a failure. So you must not promise yourselves or your patients that you can cure an incurable dysmenorrhœa or the like by removing the ovaries, and that the patient will become perfectly well. If you make any such contract, you will in many cases be unable to fulfil it. It fortunately happened that, as I was coming into the lecture-room just now, this pamphlet was handed to me. It is headed, "Failure of Removal of the Tubes and Ovaries to relieve Symptoms," by James F. W. Ross, one of the professors in the University of Toronto, Canada, a gentleman whose acquaintance I have the honor of having, and I know him to be a first-rate authority. So that you see it is not in Brooklyn alone but in Canada that we have failures. Here is one of the best British authorities living, one of the very best of the age, for he is not a very old man, and he has failures; some of his cases are very like the one now under consideration.

What is the cause of this patient's suffering? From the history and the physical signs I presume that there are adhesions which are dragged upon when she stands or walks, and that these cause pain,

and that the nervous system is disturbed because of the premature menopause.

What can we do for her? I have heard suggested that, as there are some adhesions left there after the operation, the treatment should be to open the abdomen and break them up and so give her relief. There are operators who do laparotomy to relieve symptoms. Dysmenorrhœa is a symptom merely, and if the patients do not get better, the surgeons sometimes charge themselves with not having done as complete an operation as ought to have been done, and they try the laparotomy again. Sometimes they give relief in this way; but, as a rule, if there were troubles left behind that caused pain after the first laparotomy, there is just as much pain remaining after the second, or it is merely an accident if any relief is given. Of course, if there exists some inflammatory trouble, and there are new products of inflammation established at the first operation, the second laparotomy may give relief. In a case like this, however, there is no reason to believe that the second laparotomy will be characterized by other than the same want of success which followed the first operation.

Our treatment will be tonic and sedative, such as we employ in nervous debilitated cases. This is according to a rule which I have laid down for you on former occasions,—viz., when any local painful lesion cannot be relieved by direct treatment, sustain and quiet the general organization, and thereby enable the patient to bear her affliction the better until time may bring relief.

Local treatment, such as we have advised for painful pelvic adhesions from other causes, will also be employed in this case.

ACQUIRED ANTEFLEXION OF THE UTERUS.

CASE II.—This woman is thirty-three years old; has been married sixteen months; had one child a year ago; has been unwell irregularly at intervals of five, six, or seven weeks; and has suffered pain before the flow, which lasts three days. She is now complaining of severe pain in the left side, headache, backache, and leucorrhœa.

This is suggestive, at least, of endometritis. We have also some painful menstruation. She menstruated normally before her confinement, and if this dysmenorrhœa is due to any malformation or malposition of the uterus, it is acquired.

The physical signs obtained by a digital examination indicate acquired anteflexion. This diagnosis should be confirmed by introducing the sound, otherwise the examination is not completed.

This condition of anteflexion is rather rare, and yet it occurs.

I mean it is a rare thing for a patient to have an antelexion develop after bearing children. It is an acquired malformation which occurs rarely, and nearly always can be accounted for by some lesion produced during convalescence after confinement, such as the improper use of a compress and bandage, or anything else that will make pressure on the fundus uteri and bend it over and crowd it down. I may say that the causes of these rare cases occurring after parturition are the misuse of the bandage, extreme constipation, or getting up too soon. Perhaps it may be due to other causes not well known, but such as would arrest involution or let involution proceed at one point and not at another, and permit the uterus to bend on itself.

The treatment is about the same as in a case of malformation from arrested development. First relieve the patient of the endometritis by the warm douche, the iodine applications, and so on; and when the sensitiveness of the uterus has been overcome restore the organ to its normal position. Then dilate, if necessary, and use the stem pessary after dilatation, and in that way overcome the malformation. But first relieve the inflammatory trouble, not entirely perhaps, but relieve it sufficiently, so that the treatment for the flexion will not endanger the patient by acute trouble.

The great point to remember always in these cases, when you begin the replacing of the uterus by means of the sound, or more properly, the Elliot adjuster, is to be sure that the canal is clean, and that the adjuster is aseptic. Let them be sterilized. You can sterilize the canal by taking one grain of the bichloride of mercury to an ounce of water, and washing out the canal of the cervix with a syringe or pipette. Be careful not to give pain to the patient while using the instrument. I have no doubt that we can relieve this case entirely by just such a mode of treatment.

VENTRAL FIXATION OF THE UTERUS.

CASE III.—A woman, thirty-two years of age; married ten years; had one child nine years ago. Her menstruation has always been painful. She had a miscarriage two years ago. After the birth of her child she is said to have had an attack of inflammation of the bowels, and was in bed for five weeks. Now she is complaining chiefly of painful urination. When she says she had inflammation of the bowels I think she means to say she had inflammation in the pelvic region. Among the people at large you will find that inflammation of the bowels often means peritonitis or cellulitis, or something of that kind. She has no history of having had enteritis, but she has a history of an

inflammation which undoubtedly was a pelvic peritonitis of a severe character. Her great cause of suffering now is frequent urination. This is not much relieved at night, so that she has to urinate a great many times during the twenty-four hours. We are often misled by patients telling us that they pass very little water, and we think of suppression; but when we come to find out the facts they pass very little at a time, but they pass it so often that in the twenty-four hours it amounts to the normal quantity. Such is the case in this patient. Now, this frequent urination as a symptom is very important, and we can make it of value by determining the cause of it. There are quite a number of possible causes. First of all, there is cystitis. An inflamed bladder will not tolerate distention, and when a little urine accumulates the bladder objects, the patient must urinate, and there may be pain at the close of the act, when the inflamed surfaces are squeezed together by the contraction of the bladder. Again, the bladder itself may be normal, but the character of the urine be irritating, as, for example, when the organic constituents are in undue proportion, and consequently cause frequent urination. Sometimes, also, when the urine is too much diluted, there is frequent micturition; there is a limpid urine which is unnatural, and hence the bladder does not take kindly to it. Of course, there is usually an excessive quantity of urine, but this limpid urine will cause an irritation of the bladder even when the quantity is not in excess. All of us who are fond of field sports have probably had some experience in that, when we have been out fishing or hunting and got caught in a thunder-shower and thoroughly chilled. Then comes this limpid urine and frequent desire to urinate. Again, the bladder may be perfectly normal, and the urine also, but the former be annoyed by its neighbors. Certain products of a by-gone inflammation interfere with the distention of the bladder. The adhesions will not permit it to distend; it is walled in there by resisting, unyielding substances, and hence must be emptied frequently. We must determine which of the causes is operative in this case. If there are no products of inflammation in the urine, we exclude cystitis; if the urine itself be normal in its constituents we fall back upon displacements of the bladder, or adhesions which restrict or prevent its distention. More evidence of this can be obtained by the bimanual examination. I find the uterus lying forward just behind the pubes and fixed there. Both the uterus and the broad ligaments are fixed to the abdominal walls. Sometimes, when the uterus is fixed in this way in the median line, the bladder will spread out so that its two sides will distend freely, and it gets accustomed to this, and behaves moderately

well. The adhesion, especially on the right side in this case, is very marked, so much so that it is impossible for this bladder to distend. The bladder is willing and able to behave well, but it cannot, and hence frequent urination occurs.

In this case we find that the peritonitis, which she had some time ago, has done for her what the surgeons are doing occasionally for the relief of certain displacements of the uterus,—that is, hysterorrhaphy or ventral fixation of a displaced uterus which does not yield readily to other treatment. The modern method of treating these obstinate cases of retroversion and flexion is simply to stitch the fundus to the abdominal wall. Adhesions form and fixation is established. The result of it all is this, the surgeon simply establishes one morbid condition for the relief of another; and I have maintained for a long time that the result of the morbid state produced by the operation in a great many cases is worse in its effects and causes far more trouble than the original retroversion or retroflexion. But the argument is that the operation is not performed except in cases that are incurable because of adhesions, and that the only way to give relief is to open the abdomen, break up the adhesions, raise the uterus up to the abdominal wall, and fix it there. It is true that there are cases which cannot be overcome by mechanical and medical treatment, and that can be corrected by this hysterorrhaphy, and some cases have been cured in that way; but they are not always successes, neither is it very sound surgery. The uterus was never made to be fixed to the abdominal wall, and it makes no difference whether the surgeon does it or whether it comes about by peritonitis. When the union established between the uterus and the abdominal wall is not strong, but just sufficient to hold the organ in position until its normal supports have regained their tonicity, the adhesions often give way, and then a complete recovery occurs. The immediate results of the operation correct the displacement; and by the giving way of the adhesions the objectionable effects of the operation are overcome. I mention this because this operation is quite the fashion now, and I have the idea it will have the same fate as some others of which we hear nothing to-day, though twenty years ago they were as common as this one is now. The results were apparently all right at first, but when the patients got about on their feet there oftentimes was trouble. I refer to plastic operations on the vagina.

The criticisms which I have made regarding ventral fixation of the uterus apply with perhaps more force to certain other operations devised for the same purpose. Take, for example, shortening the round

ligaments within the pelvic cavity. This has been done in two ways. The first method consists in opening the abdominal wall, doubling the ligament upon itself, and uniting the fold with sutures. The other and more recent operation consists in bringing the round ligaments together in front of the uterus, and, after vivifying the opposing surfaces, stitching them together.

One should never criticise anything until it has been thoroughly tried, but we may safely say that as yet there is no reliable evidence that these are any improvement on Alexander's operation for shortening the uterine ligaments.

The mission of true surgery is restoration. If any portion of the organism be changed, and you can restore it to the original condition, you attain the perfection of surgery; but to try to get up some new arrangement like this of bringing the broad ligaments together or doubling them upon themselves and sewing them together, so as to shorten them, is a departure from the original plan or design and is seldom an improvement. I have never observed that the surgeon improves very much upon the original.

This last operation (only one has been recorded so far) of bringing together the round ligaments and fixing them in front of the uterus, so as to shorten them and keep the uterus from falling backward, is reported as a perfect success. We may, however, raise the question as to whether it will remain a success. If a woman with a ventral fixation of the uterus, like the case before us, or one that had the same fixation produced by an operation, should become pregnant, she would be very likely to suffer more than before.

The treatment in this case should be directed to undoing the adhesions, in order to set the uterus at liberty and give it that function of motion in the pelvis which is natural to it.

The natural tendency to the absorption of the plastic material which forms the adhesions should be stimulated by counter-irritation, iodine, massage, and the galvanic current.

This may give relief in this case, as I have found it to do in cases that were crippled from hysterorrhaphy.

EFFECTS OF DOUBLE OVARIOTOMY AND OÖPHORECTOMY ON THE SECONDARY SEXUAL CHARACTERS OF WOMEN.

CLINICAL LECTURE DELIVERED AT THE MIDDLESEX HOSPITAL.

BY J. BLAND SUTTON, F.R.C.S.,

Assistant Surgeon to the Middlesex Hospital.

GENTLEMEN,—*Sex* is a term used to express the characters by which an animal or plant is male or female. These characters form two groups.

Primary sexual characters are those directly associated with the essential function of reproduction, comprising in the human female the ovary, Fallopian tube, and uterus,—organs in which the ovum is produced, and, when impregnated, retained for a period until it is fit to lead an extra-uterine existence. To these must be added the mammary glands,—organs which furnish a secretion on which the young are, for a variable period, nourished.

Secondary sexual characters are those which enable us to distinguish male and female irrespective of the organs of reproduction and those used for the nourishment and protection of the young. The characters belonging to this group, so far as the human family is concerned, are exclusively in the possession of the male. Man is distinguished from woman not only in the possession of a beard and a greater muscular development with its necessary accompaniment, greater physical strength, but he has a more powerful voice, his skin is thicker and more abundantly supplied with coarse hair, which has a different disposition from that of women. In man the front of the chest is usually covered with hair, and that on the pubes passes upward to the umbilicus. In woman there is no unusual growth of hair on the chest, and the pubic hair does not extend upward to the umbilicus, but remains restricted to the mons Veneris. A less constant feature, but one which seems to be peculiar to men, is a growth of hair on that portion of the pinna known as the tragus.

Secondary sexual characters become manifest at *puberty*, by which term we signify reproductive maturity. In the female the accession

of puberty is strikingly declared by the institution of *menstruation*, and, in the majority of cases, by an increase in the size of the mammary glands. Up to the period of puberty the boy, in so far as secondary sexual characters are concerned, resembles the female as much as he does the male, but after its accession he begins to assume the characters indicative of the male.

I now propose to study secondary sexual characters from a clinical stand-point. Few opinions in the profession of medicine rest upon such unsatisfactory evidence as do those relating to the effects of double ovariectomy and oöphorectomy. It is imagined by many that after removal of the ovaries women become hairy about the face, the *mammæ* atrophy, and they, in short, assume many of the secondary sexual characters of the male. This error may be traced to two sources. One is the assumption that certain changes observed in birds and deer after injury to, or disease of, the sexual glands holds good in men and women; the other source of error is the oft-quoted case reported by Percival Pott.¹ In this case a robust and healthy woman, twenty-three years of age, suffered so much inconvenience from a swelling in each groin that, after due consideration, they were explored. Two bodies excised from these swellings were regarded as ovaries, but they were not examined microscopically. The concluding paragraph of Pott's brief account of the case is this: "She has enjoyed good health ever since, but is become thinner, and more apparently muscular; her breasts, which were large, are gone; nor has she ever menstruated since the operation, which is now some years."

This is a typical example of the flimsy evidence on which textbook writers rely. In this case there are only two facts stated with any approach to certainty; these are, (1) the woman ceased to menstruate, (2) years afterwards her breasts were gone. It must be remembered we have no proof that the bodies removed from the groins were ovaries. In some instances when organs supposed to be ovaries have been removed from the inguinal canals, the microscope has shown them to be testes. The only evidence in Pott's case that the bodies were ovaries is the statement that she menstruated regularly before the operation. I know of no case in which menstruation coexisted with testes, but well-developed *mammæ* may be associated with testes, as in the celebrated case recorded by Dr. Chambers. It is a curious fact that in this instance it is reported a month after the operation: "The left breast has almost disappeared, while the right remains the same as

¹ *Chirurgical Works*, 1775, Case xxiv., p. 791.

be ore the operation.”¹ Pott’s case no more proves that the removal of the ovaries will lead to the atrophy of the mammæ and the assumption of secondary sexual characters than that the existence of antlers in a doe roe-deer indicates sterility. As antlered does are instructive in relation to this question, it will be useful to very briefly mention a few facts in this direction.

Female deer are occasionally seen with antlers which resemble very closely the stunted specimens seen on the heads of castrated bucks. It is believed by many that such specimens are very frequent, but an inquiry into the matter shows that this is not the case. That female deer put up antlers occasionally is beyond doubt. One of the most accessible specimens is preserved in the museum of the Royal College of Surgeons, London. It is the skull of a doe roe-deer, shot by the Earl of Egremont, near Petworth, Surrey, in 1810, and presented by him to the museum. The antlers, to judge from the specimen, were covered with “velvet.” One is a simple curved snag nearly eight centimetres in length with a well-developed burr; the other is a mushroom-shaped burr without any beam. Lord Egremont, in a letter, expressly stated that the deer was *a very old and uncommonly large female with two young ones in her*. The pregnant condition of this animal must not be regarded as very unusual; in Germany, where roe-deer are more plentiful than in this country, many does with antlers have been seen; Dr. Altum has observed no fewer than forty instances. Most of these were barren animals, and the antlers were always of a more or less abortive character, except one case in which the normal male form was well reproduced; *several were fertile*, and were either with young when killed or had recently given birth to fawns. Such abnormal antlers are persistent and permanently covered with velvet.

It has been difficult to obtain precise information as to the actual condition of the reproductive organs in these antlered females, and the statement that they are mostly barren, though significant, is not sufficiently precise for our purpose. In 1791, Hoy briefly communicated to the Linnæan Society a few facts about a *one-horned hind*. It was a hind, the female of *Cervus elephas*, shot by the Duke of Gordon, which had one horn perfectly similar to that of a stag three years old. It never had a horn on the other side of the head, for there the corresponding place was covered over by the skin and quite smooth. It does not seem to have ever produced a fawn, and, upon dissection, the ovarium of the same side with the horn was found to be scirrhous (Trans.,

¹ Trans. Obstet. Soc., vol. xxi. p. 256.

vol. ii. p. 356). We have authentic evidence of the occurrence of antlers in female deer in the following species: roe-deer, Virginia deer, moose, and red-deer. Antlered females in other Cervidæ seem to be of very rare occurrence, except the reindeer, the females of which possess antlers normally.

Thus the evidence shows clearly enough that the presence of antlers in the doe is no proof of sterility, any more than a slight growth of hair on the lips and chin of a woman indicates barrenness, for most of us could adduce instances of women the unfortunate possessors of a growth of hair on the lip, but mothers nevertheless.

I have made many personal inquiries into this matter, and sought far and wide in special writings for evidence in support of the statement that removal of the ovaries tends to cause

abnormal growth of hair. The following are characteristic examples of the evidence: Olshausen¹ refers to a case mentioned by W. Atlee, in which a woman, after excision of both ovaries, developed a beard fourteen years after the operation. The patient was then fifty years of age. Peaslee mentions three cases in which women with ovarian trouble had tolerable beards. He did not follow up the cases.

Statements of this kind must not be accepted as evidence that the appearance of the beard depended on the removal of the ovaries. Indeed, evidence can be quoted in the opposite direction. Clement Lucas² communicated to the Clinical Society, London, a case of early puberty in a girl seven years of age, from whom he removed an ovarian tumor. The external genitals were precociously developed, there was considerable growth of hair on the pubes, enlarged mammæ,



Head of a doe (*Capreolus caprea*) with antlers, beset with exostoses, and velvet-covered.

¹ Die Krankheiten der Ovarien, 1886, p. 879.

² Trans. Clin. Soc., vol. xxi. p. 224.

and menstruation. After the operation these signs for the most part reverted to their normal state; before she left the hospital the prominence of the mammæ had much subsided. In contrast to this, Olshausen reports that he removed a large proliferating ovarian cyst from a girl of sixteen years who had not menstruated. In bodily conformation she resembled a girl of ten or twelve years.

Mr. Thornton and Dr. Myrtle¹ have recorded the details of a very unusual case in which abdominal nephrectomy was performed for a large sarcoma of the left supra-renal capsule. Mr. Thornton writes: "The patient, who was a married lady of thirty-six, mother of one child, aged thirteen, had another curious pathological condition, which had developed soon after the oöphorectomy performed by Dr. Keith, six or seven years before I saw her. She was covered all over with long silky black hair, and had to shave her face just like a hairy black man." Dr. Myrtle writes: "Here I may remark that the mammæ had disappeared, and that her cheeks, upper lips, and chin were covered with soft darkish down, such as you see on a lad of eighteen or nineteen, and that the arms and forearms were also hairy." We must not hasten to attribute these changes to the removal of the ovaries. The supposed sarcoma of the supra-renal capsule was removed in April, 1889; in November of the same year she wrote to Dr. Myrtle: "I am much like my old self and have all the external appearances of other women." The facts of this case indicate that the irritation of the sarcoma had more to do with the growth of hair than the oöphorectomy.

Let me now consider the effects of complete removal of both ovaries upon menstruation. This is an important subject, because surgeons occasionally remove both ovaries for the purpose of anticipating the menopause in some cases of uterine myomata. In 1859, Farre,² in his classical article "Uterus," expressed the following opinion relative to the influence of the ovaries on menstruation: "Their artificial removal is followed by a permanent cessation of the catamenial flow, although the uterus may be left uninjured." A critical analysis of the evidence adduced by subsequent writers in opposition to this opinion has served to convince me that Farre's statement is absolutely correct. It is beyond all dispute that some women, after both ovaries and tubes have been completely removed, suffer from discharges of blood from the vagina; this cannot be disputed, but vaginal hemorrhage of any kind does not constitute menstruation.

Before discussing these irregular hemorrhages it must be mentioned

¹ Trans. Clin. Society, vol. xxiii. p. 150.

² Todd's Cyclopædia, Supplement,

that the Fallopian tubes exercise no influence on menstruation, and in order to produce artificial amenorrhœa both ovaries must be completely removed. Let me mention a few facts which will show that the tubes exercise no influence.

The museum of the Royal College of Surgeons contains two large specimens, described in the catalogue as dilated Fallopian tubes.¹ On one of them there is a fragment of ovary; no trace of the ovary can be detected on the other. Sir Spencer Wells removed them from a woman twenty-three years of age, and reports that "Menstruation has continued regularly since the operation." In 1890 I attempted to perform double oöphorectomy in a woman with a large and rapidly-growing uterine myoma. The right ovary and tube were easily removed; the left ovary could not be found, but the left tube was cleanly and completely removed; the woman menstruated as regularly as before the operation. In December, 1890, I attempted to remove the ovaries and tubes in a case of very large myoma. Those of the right side were removed easily, but the left tube and ovary were so embedded in the tumor as to make their removal impossible. I ligatured the tube firmly with two stout gut ligatures. The patient has not missed a period since the operation. In 1888, Dr. Champneys² performed Cæsarean section on a dwarf, and in order to prevent fecundation he ingeniously ligatured the tubes with a piece of kangaroo tendon. Dr. Champneys in a letter informs me that the woman has menstruated regularly since the operation.

We have now to discuss the cases in which so-called menstruation continues after removal of both ovaries and tubes. In a few of the reported cases menstruation appears for one, two, or three periods, then ceases forever. In others the patients have amenorrhœa for a few months, then menstruate for a few periods before it permanently ceases. In most cases of double ovariectomy or oöphorectomy, blood issues from the vagina within twenty-four hours of the operation, and lasts sometimes two days. These irregularities cannot be advanced seriously as persistence of menstruation after removal of ovaries or tubes. The same irregularity is reported by women at the climacteric period. The cases we have seriously to discuss are those in which, after removal or supposed removal of both ovaries, menstruation has persisted. Mr. Thornton³ attempts to explain this by assuming the existence of a

¹ I believe them to be really dilated horns of a bicornuate uterus.

² Trans. Obstet. Soc., vol. **xxi**. p. 136.

³ Heath's Dictionary of Surgery, article "Oöphorectomy."

third ovary. This explanation must not be entertained. *There is no authentic instance on record of a third ovary.* Specimens reported as supernumerary ovaries are usually instances of deeply-fissured ovaries; several cases of supposed third ovaries lack histological demonstration, without which they cannot be received as evidence.

I have made careful search through the museums of pathology in London, and have failed to find a "third ovary." The museum of the Royal College of Surgeons contains an ovary with the ovarian ligament: the latter presents a small rounded nodule in its substance; this was examined by Doran, and found to be a small fibro-myoma. In his description of this specimen Doran¹ writes: "My experience in this case leads me to believe that others may have mistaken a fibro-myoma of the ovarian ligament for a supernumerary ovary." It was also a very remarkable circumstance that the opposite ovary of this patient presented a small lobe, such as is termed a supernumerary ovary. Olshausen² has collected many reported instances of supernumerary ovaries, and refers to those described by Beigel and Winckel. An examination of the drawings in Winckel's work shows that the so-called accessory ovaries are merely small pedunculated bodies attached to the ovary, and, to judge from the descriptions, many of them were probably pedunculated cystic bodies connected with the parovarium. Olshausen's statement, that Beigel found accessory ovaries eight times in three hundred and fifty female bodies, and Winckel eighteen times in five hundred bodies, still further confirms my opinion that many of these bodies originate in the parovarium, and a few are corpora fibrosa.

It is an important fact that the reported cases of persistent menstruation after removal of both ovaries have usually been patients in whom the operation has been performed for chronic inflammatory affections of the tubes and ovaries, or for uterine myoma.

The supposed persistence of menstruation after removal of both ovaries is capable of explanation in two directions.

1. In some cases it is due to an imperfect removal of the ovaries; they may be so adherent to surrounding parts that it is impossible to be quite sure no ovarian tissue is left. In uterine myoma the ovary is sometimes elongated like a cord, so that a portion of the gland may easily be left on the proximal side of the ligature without the surgeon being aware of it.

2. The persistent hemorrhage, in patients from whom both ovaries have been completely removed in order to check profuse bleeding due

¹ Krankheiten der Ovarien, 1886, s. 14.

² Frauenkrankheiten.

to myoma, is not infrequently due to the presence of a submucous tumor which has been overlooked. In several such cases it has been necessary to dilate the uterus when the presence of such a tumor has been suspected. Its removal at once checks the supposed menstruation. Operators are rarely frank enough to record such cases. Irregular hemorrhage from the vagina simulating menstruation after complete oöphorectomy is, in some cases, due to the irritation of the ligatures used for the pedicle. This subject requires extended investigation.

Dr. Howard A. Kelly,¹ in a short paper on "The more Remote Results of removing the Ovaries and Tubes," writes that he has "several times seen *severe hemorrhages* a year or two after operation." In 1888 he removed two tubo-ovarian abscesses; the patient had a slow convalescence, but finally recovered complete health. Subsequently she suffered from periodical uterine hemorrhages. Dr. Kelly discovered a mass about an inch and a half in diameter at the right uterine cornu, which he regarded as an old ligature encapsuled. He performed abdominal section, removed a serous cyst, apparently within the folds of the broad ligaments, and in it found the silk ligature. There was no trace of ovary on either side. He said he could recall five such cases. It must also be borne in mind that the patients ignorantly mistake the source of hemorrhage. On one occasion I removed both ovaries and tubes for early tubal gestation. The patient assured me that she menstruated as regularly as before the operation; for nearly two years I believed her. It then occurred to me to verify the patient's statement. To my surprise I found the source of the supposed menstruation to be internal piles. These I removed, a proceeding which effectually stopped the hemorrhage.

In a discussion² on persistent menstruation after double ovariectomy at the Obstetrical Society of New York, October 19, 1886, Dr. Mundé "recalled an oöphorectomy which he had seen Dr. Noeggerath perform. The operation was done for the relief of dysmenorrhœa. The patient continued to menstruate for a year after her recovery, and the dysmenorrhœa and other abdominal pains persisted. Her abdomen was reopened, the intestines which were found adherent to the cicatrix were lifted out of the pelvis, the stumps of the removed ovaries and the surrounding adhesions were cut off and then thoroughly cauterized, yet after this second laparotomy the patient continued to menstruate just the same as before. Four years later she entered the president's

¹ The Johns Hopkins Hospital Bulletin, Baltimore, May 1, 1890, p. 57.

² Am. Journal of Obstet., vol. xix. p. 1268.

(Dr. Mundé's) service at Mount Sinai Hospital, this time *with a well-marked uterine fibroid*, which he was sure had not existed at the last operation. Her periods still recurred regularly. She refused further interference and was lost sight of." This case tells its own tale.

Vaso-motor Disturbances.—The most frequent and troublesome form of nerve-disturbance which is liable to arise after removal of both ovaries and tubes is the peculiar phenomenon commonly termed "the flushes." Campbell, in his interesting work, defines a flush as *a nerve-storm in which a rush of blood to the skin and a sense of heat are generally the most obtrusive manifestations*. He then goes on to state that in a fully-developed flush the patient at first feels hot, some portion of the skin being flushed with blood; immediately after, or in a very short time, sweating occurs; finally, while the sweat is still on, or while it is diminishing, or after it has actually disappeared, the patient feels cold or may shiver.

It is not my intention to enter into the physiological side of the question; those who desire to do so should carefully study Campbell's book.¹ My intention is merely to consider "flushing" as a sequel to double ovariectomy and oöphorectomy. It is well known that as women approach the menopause they are especially liable to "heats" or "flushes." When menstruation finally ceases flushes may recur so frequently as to cause the patient much distress. In the course of two years they so diminish in frequency and in force that the individual is no longer distressed by them.

When the menopause is suddenly brought about by double ovariectomy or oöphorectomy these flushes begin to manifest themselves, and in some patients they are very distressing. I have made many observations on such cases, and find it impossible to foretell whether a given patient will suffer from flushes or not. I find that the phenomenon ensues upon the operation quicker in women who are near the menopause; it lasts longer, and is more frequent and pronounced, in them than in younger women. It seems to follow equally after double ovariectomy, oöphorectomy for inflammatory conditions, and for myoma. In one patient the flushing began three days after the operation; in most cases it is delayed some months, and in a few the flushes may not be frequent until a year has elapsed. In one patient the flushes recurred ten times an hour, and this went on for several months. In women between twenty and thirty the flush is, as a rule, very mild even when frequent.

My observations induce me to believe that they are more severe

¹ Flushing and Morbid Blushing, London, 1890.

after hysterectomy in women between the fortieth and fiftieth years. After this operation there is another very remarkable condition which other surgeons must have observed. It is this: on comparing a number of temperature charts, it will be found that in many there is in the course of convalescence a very sudden rise of temperature. Sometimes it will reach as high as 105° , usually it is 103° or 104° . When this occurs the surgeons may feel that something is wrong with the patient, yet she will appear comfortable and her general condition is not consonant with the temperature-records. When this is the case, a cautious inquiry will show that the day on which the temperature rose, according to the patient's reckoning, would be the date on which she would in the ordinary way expect to menstruate. I have often tested this in my patients and in those of other surgeons. Knowledge of this fact has on several occasions spared me much anxiety.

With regard to treatment, I know of no drugs which have any effect in preventing or in any way diminishing the force and frequency of the flushes. I have tried many, but now adopt no form of treatment, but endeavor to comfort the patients by the assurance that the disturbance will slowly diminish until it ceases to be even inconvenient.

The influence of the removal of both ovaries from a sexually mature woman upon the sexual appetite I do not propose to consider. This subject has been discussed by many writers.

My inquiry may be summarized thus:

1. There is no evidence that double ovariectomy and oöphorectomy leads to any unusual development of secondary sexual characters.
2. There is no evidence that such operations induce atrophy of the breasts, but they may cause obesity in women who have a tendency to form fat.
3. With extremely rare exceptions menstruation is permanently arrested. Irregular hemorrhages may follow the operation, due to irritation of the ligatures, submucous tumors, or other uterine disease. Such must not be confounded with menstruation.
4. In most the sexual appetite is unaffected, in a few it is destroyed, but in many it is restored.
5. A *third* ovary has yet to be demonstrated.
6. A careful study of the question leads me to subscribe to the opinion of Tissier¹ that "Le cas ancien de Pott, où la castration fut suivé de modifications de l'habitus extérieure, de la voix, du volume des seins, est resté presque isolé."

¹ Delbet, "Des Suppurations Pelviennes chez la Femme," p. 338, Paris, 1891.
Vol. II.—15

Neurology.

THE METHODICAL EXAMINATION OF PATIENTS WITH DISEASES OF THE NERVOUS SYSTEM.

INTRODUCTORY CLINICAL LECTURE DELIVERED AT THE MASSACHUSETTS
GENERAL HOSPITAL.

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logical Department of the Massachusetts General Hospital.

GENTLEMEN,—In no branch of medicine are method and thoroughness more important in the matter of examining patients and making clinical records than in neurology. Opportunity is not infrequently offered, it is true, for brilliant and rapid diagnosis, based on the gait, the expression, or the movements of the patient; and not infrequently can the trained neurologist reach the correct diagnosis at a glance, in a case which has long baffled the practitioner less versed in this department of medical science. These opportunities constitute, however, but a small proportion of the sum total of clinical material submitted to this department. Accuracy and rapidity of observation are certainly important to the neurologist as well as to the surgeon, though in a lesser degree, but far more essential is the power and patience to elicit symptoms and collect physical signs in order and completeness, and draw therefrom the logical deductions leading to a matured diagnosis.

It is also important to be able to make a record which shall portray the clinical history succinctly, and yet as completely as the case warrants, and in such order that any particular detail may be found without waste of time.

It is to the subject of method in diagnosis, and method in recording the clinical history of nervous patients, that I shall call your attention to-day.

In the first place, do not be afraid to produce a note-book at the outset if visiting a patient at his home, or your case-book at an office visit. In certain urgent cases this will, of course, be out of the ques-

tion, and by an occasional patient the proceeding will be viewed with disfavor, as betokening a man of letters rather than of practical experience; but the large majority of your patients will construe note-taking as an evidence of care and system, and will appreciate it accordingly. I have never regretted my own practice of producing the book at the commencement of every examination where it is practicable, though I *have* had occasion to regret the fact that certain cases have been omitted from my records and certain details left out in others.

The first step in taking the history should be to note the name, age, nationality, condition (married or single), and address of the patient,—or the parents' address, in case of children. This may seem a needless precaution to mention, but, in point of fact, it is not a universal custom among practitioners, and the omission is likely to cause annoyance when least expected, more especially the lack of a post-office address. The date of visit should also be inserted.

In proceeding with the history no one method will, of course, be universally applicable, but that which I shall suggest will apply to difficult and complicated cases, and cases of such importance (for example, those with medico-legal complications) as to require that no detail be omitted. In simpler and more obvious cases the history may be reduced or the order reversed, as may seem desirable.

In the complete record the family history should precede the personal, and the personal history precede the physical examination; but in the practical examination of the case it will generally be best to begin at once with the patient's complaints. In case of trauma the complete history of the accident should be obtained, not omitting to ascertain where, and how, and with what violence the patient was struck, what bruises or other physical signs remained and how long they existed, whether consciousness was lost, and if so, for how long, and how he got to the hospital or his home; the duration of confinement in bed and to the house, and the duration of detention from business. If the patient has returned to business, ascertain how much he is able to do now as compared with what he did prior to the accident.

We come now to the patient's complaints, past and present. These may be taken up either in order of priority or in order of importance, as may seem most appropriate. I myself commence, as a rule, with the symptom considered by the patient to be most troublesome. With whatever symptom we commence we should ascertain its duration, its method of onset (sudden or gradual), its course (whether continuous or intermittent, and whether worse or better), its seat, and its character. This patient, for example, complains of headache. We find that it has

troubled her for many years. It appeared on the first occasion quite rapidly, being preceded by a blur before the eyes, which passed off as the headache came on, the latter soon reaching its maximum intensity. She has been subject to such headaches at intervals of from weeks to months ever since, the attacks lasting about a day. The pain is, on the whole, no worse now than at first; it is generally frontal and unilateral; it is a dull ache, distressing, but not sufficiently acute, as a rule, to prevent sleep; it is sometimes accompanied by nausea; it is worse after using the eyes. This history is sufficiently complete to help us greatly towards the diagnosis, the character, seat, duration, and intermittency pointing to migraine, and offering little or no suggestion of cerebral tumor or other organic disease, while the association of ocular symptoms would lead us to investigate the patient's refraction as a possible or rather probable source of the entire trouble.

Here is a man, on the other hand, who complains of a headache which came on gradually some five months ago, has steadily increased in intensity with little or no intermission up to the present time. It is now of the most distressing character, boring, pressing, splitting, generally worse at night and sufficiently severe to interfere materially with sleep. It is seated in the left temporal region. This history points to an organic cerebral trouble, probably tumor, and affords us a most satisfactory starting-point for further investigation, for a well-grounded suspicion of this sort at the commencement of an examination is by no means a drawback, but rather an assistance towards a complete and unbiased diagnosis, provided we stand ready to relinquish it on further investigation. Such a suspicion only leads us to look for further symptoms which may not be mentioned by the patient.

The next step is to investigate in a similar manner the other symptoms. He complains, for example, that about a year ago he lost his vision gradually, especially in the left eye. The sight was blurred, and he could pick out a few words only. The loss has remained permanent in the left eye, but the right eye gradually improved after about a month, so that he can now read with it. He complains also of steadily increasing loss of power in the right leg and arm, which came on gradually at about the same time as the headache. He complains further of an irritable stomach, and a tendency to vomit irrespective of ingestion of food. This trouble commenced gradually, coincidently with the headache, and has, on the whole, increased, but with intermissions.

Having now exhausted the patient's memory, we come to the further symptoms suggested by our provisional diagnosis, which is that of a steadily increasing organic cerebral disease. We find no history

of mental deterioration, no double vision, no vertigo, no numbness in any part; but a moderate loss of weight, and considerable loss in general strength, dating from the onset of the trouble and gradually and steadily increasing. No loss of hearing, taste, or smell is complained of, no staggering, no spasms, no convulsions, no loss of consciousness, no rigor, no discharge from the ears, no pulmonary symptom, no trouble in micturition.

It is now time to inquire into the family and previous history, the latter especially with reference to syphilis.

In the family history nothing of importance is elicited. The patient denies original infection, eruption, sore throat, and falling out of hair. This does not absolutely eliminate specific taint, for, even supposing the patient honest in his answers, the chancre may have escaped his notice, perhaps having been in the urethra, and, as regards the secondary symptoms, it is a well-known fact that these are often wanting where the tertiary are pronounced.

We have now exhausted the history, and will proceed with the *physical examination*, with a very clear idea of what we are to look for.

No physical examination is complete in which we have neglected to investigate (1) motion, (2) sensation, (3) the reflexes, (4) nutrition, (5) the pupils, (6) the speech, (7) the mental condition, (8) electrical reactions, (9) the special senses, (10) the fundus oculi, (11) the ears, (12) the pulse, (13) the heart and lungs, (14) the abdomen, (15) the temperature, (16) the organs of reproduction, (17) the urine, (18) external signs.

1. *Motion*.—This may be divided into (a) general and (b) special.

(a) Observe the gait (whether ataxic, spastic, festinating, or weak); observe choreic and athetoid movements, spasm and contracture, tremor, whether fine or coarse, and whether increased by voluntary movement. Have the patient get up in a chair, lie down and get up, stand with the feet together and the eyes shut, button and unbutton his clothes, grasp your hand. Have him bend his head forward, backward, and sidewise, and rotate it; have him make the same six motions of the trunk. Have him place his hand on his head, behind his back, and across his chest. Have him flex, abduct, adduct, and rotate the thigh on the trunk; flex and extend the forearm and lower leg; flex, extend, abduct, and adduct the hand and foot. Test his co-ordination by making him draw imaginary circles in the air with his feet and hands, bring the fingers together, touch his nose or his ear, and locate a spot on the blackboard several times with his eyes shut after having ascertained its position with them open.

(b) Test the separate muscles by opposing them : for example, hold his arm down while he tries to raise it directly from the side (deltoid), hold it up while he pulls it to the side (pectoralis major and latissimus dorsi), place your fingers between his while he tries to compress them (interossei), hold his lids up while he shuts them (orbicularis palpebrarum), put your fingers between his lips on each side while he shuts them together (orbicularis oris), and so through all the separate motions practicable or necessary to test. In trying the movements of the eyes have him follow your finger up and down, to the right and the left. Do not forget that the biceps is a rotator when the forearm is semi-flexed, and that the supinator longus is a flexor, more particularly when the forearm is in such a position that the thumb is upward ; test the latter, therefore, by making him flex his forearm with the thumb pointing upward, while you hold his hand down at the wrist. In health the edge of the muscle becomes very prominent, its attachment being high up on the humerus.

If any motion be defective, assure yourself by passive movement of the part that the difficulty does not lie in a mechanical impediment (adhesions, ankylosis) ; also, that motion is not prevented by pain, as in rheumatism.

As a result of this investigation we find in our second case a toe-drop and spastic gait with contracture on the right side, an awkwardness in buttoning the clothes with the right hand, and a rather feeble grasp. We find also that the mouth is a little twisted to the left, especially when he shows his teeth, and that the lips do not close on the finger as firmly on the right as on the left side. The wing of the nose is not raised quite as well on the right. Both eyes are closed together perfectly, but he cannot close the right alone. This is a characteristic of facial paralysis from lesion above the pons, the paralyzed orbicularis still working in unison with its mate, probably because long use of associated fibres between the lower centres renders a one-sided impulse sufficient to close both eyes. Make sure, however, that the patient could formerly wink the eye alone. Examining the separate muscles, we find none completely paralyzed, but all movements of the arm and leg weakened, especially the extensors, the trunk-muscles being apparently unaffected.

Running rapidly through the same test on our first patient, we find no impairment, and the case affords us an opportunity to test the various muscles and combined movements in health—a valuable practice.

2. *Sensation*.—Test the tactile sense by touching different parts lightly with the finger, having the patient first close his eyes and answer “yes” when he is touched. If this touch be everywhere felt, try

a lighter one with a thread or feather; if this be felt, tactile sense is normal. If the finger be *not* felt, see how severe a pressure or pinch is felt. In case of defective sensation find its boundaries, and note whether it lies in the regions supplied by one nerve, or whether it involves irregular patches, or large areas, as an arm, a leg, or half the body. A good measure of sensibility is to note whether the head of a pin is distinguished from the point. Look for tenderness in the course of nerves or elsewhere, and for hyperæsthesia, general or in areas. Test the pain-sense by pinching, and by the faradic brush if it seems necessary, the latter showing also the electrical sensibility fairly, though not quite so accurately as an electrode invented by Erb for this purpose, the ends of the wires of which are embedded in rubber so as to furnish a smooth surface. Test the so-called "muscle-sense" by moving his toes, feet, or fingers in different directions, and finding whether he recognizes with the eyes shut what you are doing. Test the temperature-sense by test-tubes filled with hot and cold water, or, roughly, by a cold key and one warmed by the hand. Test the pressure-sense by laying coins or other objects of different weights but similar shape upon the skin and inquiring whether he notes the difference; do not allow him to "weigh" them, for this tests also the muscle-sense.

All these tests prove negative in both our cases.

3. *The Reflexes*.—Test the patellar, plantar, cremasteric, and abdominal reflexes, and look for ankle-clonus. For the knee-jerk have the patient cross the knee naturally, relaxing as far as possible. Place your hand at the same time upon the quadriceps femoris, a contraction of which you may feel even though no raising of the toe is noticeable. In certain cases the knee-jerk will be best elicited with the foot on the ground, the contraction of the quadriceps being recognized by the hand. If the patient be in bed raise the leg at the knee to a slightly obtuse angle, letting the heel drag on the bed to insure relaxation. Do not raise the knee too high or you will put the tendon too much on the stretch, nor too little or it will not be stretched sufficiently. Have the patient "reinforce" by grasping some object. Remember that the knee-jerk is occasionally almost imperceptible in normal individuals. Do not mistake a lively reflex for an exaggerated one; the former sometimes appears in health, but it is not accompanied by a clonus either in health or in functional nervous disease, where it also often appears. In the latter the knee-reflex is apt to be accompanied by a jerk of the whole body and perhaps by a disagreeable sensation, which is rarely noticed in organic disease. Do not mistake a few reduplications rapidly dying out for an ankle-clonus, which, to be typical,

should be continuous and rather increasing than diminishing until it is fully established. In testing the abdominal and plantar reflexes have the patient lying at ease, and remember that they are apt to disappear rapidly on repetition. For the cremasteric reflex stroke the inside of the thigh, and do not mistake the vermicular movement of the dartos (best produced by pinching the scrotum) for a cremasteric reflex. This reflex is much more lively in youth than in adult life, often raising the testis nearly to the inguinal ring.

In our second case we find an exaggerated knee-jerk on both sides, most marked on the right, on which side there is an ankle-clonus.

4. *Nutrition.*—Note the general condition, whether well nourished, fairly nourished, poorly nourished, or emaciated. Note the condition of the skin, whether warm, cool, or cold in various parts, especially over muscle-groups under question. Observe whether there are “glossy fingers,” whether the nails are curved or brittle, whether there are bed-sores, whether the hair is deficient, whether groups of muscles are definitely wasted and hollowed out, or whether there is merely a general flaccidity. Measure the arms and legs.

5. *The Pupils.*—Observe whether alike or not, whether round or irregular in shape, whether they react to light and to accommodation. Do not try to make the former test in a dark place, unless you are intending to test by using artificial light, but place the patient directly in front of the window. Do not place your head in your own light. In doubtful cases do not try to see both pupils at once. Place the hands over the eyes, allow time for dilatation, and then uncover them. If repeating the test several times, allow time for the oscillation to be completed between dilatation and contraction. Do not mistake for a reaction to light a slight contraction of the pupils due to accommodation on the eyes being uncovered. In testing accommodation let him look at your finger, then directly by it to an object at least twenty feet away. He must look directly by it, because otherwise the movement of the eye may cause you to miss the dilatation. Repeat the test as many times as necessary, remembering that it is often easier to notice the dilatation than the contraction. Observe adhesions of the iris, and do not mistake an occluded pupil for one with simple loss of light-reflex. A certain familiarity with the appearance of the iris in local disease—iritis, for example—is an essential prerequisite.

6. *The Speech.*—Note if nasal, hesitating, tremulous, scanning, monotonous, incoherent, or aphasic, or if words are elided or run together. Observe the writing, whether steady or tremulous, regular or irregular; and, if defective, whether it is due to mechanical impairment or to

mental defect (the latter shown, for example, by leaving out and repeating words, leaving sentences unfinished, general lack of connection, etc.). Have the patient repeat one difficult phrase, as "Fourth riding regiment of light artillery;" a good sentence for him to write is "God save the Commonwealth of Massachusetts." In children note whether defective speech is not due simply to lack of training.

7. *The Mental Condition.*—Into this we need not go in detail. Observe, however, whether unconscious, semi-conscious, or delirious; whether exalted, melancholic, stuporous, lethargic, or emotional. Discover if possible whether delusions, illusions, or hallucinations are present; inquire whether the patient is changed in his disposition or habits. Do not always expect to find delusions of grandeur in general paresis. In questions of retarded development or idiocy, inquire whether the child understands games according to his age; note restlessness and destructiveness; observe the shape and solidity of the skull; examine the hair and the palate.

8. *Electrical Reactions.*—Remember that you may find degeneration reaction with good motion, as, for example, in convalescence from lead-poisoning. A stronger current is necessary to bring out the reaction in the lower extremities than in the upper. Allow for resistance of the skin; moisten the electrodes well with hot water; acquaint yourself with the motor points. Do not mistake a twitch of the limb, whether voluntary or involuntary, for a muscular reaction.

9. *The Special Senses.*—*Sight.*—Test each eye separately. Do not have the patient hold the other eye firmly shut, but place the hand or other object before it without pressure. If you use test-types, measure the vision by a fraction, the numerator representing the patient's ability, the denominator normal vision. For example, if a patient reads print at five feet which should be at twenty, his vision is represented by $\frac{5}{20}$. Have him read the letters aloud, not simply say he sees them. Before testing the acuity of vision correct errors of refraction, if present. Test the field of vision both for form and color, remembering that in tobacco-amblyopia the loss for colors is central, in hysteria peripheral. If sight be too poor for reading, see whether he can count your fingers placed against the dark coat with the light falling on them, and, if so, at what distance. If not, see whether he can distinguish light from darkness by intercepting the light with your hand. Good vision is not inconsistent with optic neuritis. Remember, that however skilful you may become in this branch, a good oculist is more so.

Our case of suspected cerebral tumor has vision of $\frac{2}{20}$ in the left eye, and $\frac{1}{10}$ (or 1) in the right.

Hearing.—The hearing should be tested by the tuning-fork through the air and through the bone, by the watch, by the whispered and the spoken voice. Close the opposite ear while testing. In comparing the two ears begin in each beyond the probable range of hearing and approach; if the opposite plan be followed in either, the range of hearing on that side is increased, through the ear becoming accustomed to the sound. In testing by the voice remember that certain sounds are heard farther than others; for example, "six" is heard farther than "one." In testing a child's hearing make sudden noises behind his back while his attention is directed forward; but remember, meantime, that the field of vision is extensive, and that a deaf child will turn quickly on *seeing* a movement at one side, and thus give the impression that he *hears*.

In testing *taste* use salt, sugar, and quinine (best in solution), avoiding odoriferous substances, which are smelled rather than tasted. Have the patient moisten and protrude the tongue, and in reply to the question as to whether he tastes have him nod or shake the head without withdrawing the tongue, because if the tongue be withdrawn and moved about in the mouth, both sides and other nerve-terminations are called into requisition. Remember that bitter substances produce most effect farther back, sweet substances on the tip of the tongue. Taste on the tip of the tongue is sometimes almost entirely absent in health.

10. *The Fundus Oculi.*—It is well to familiarize yourselves at least with the typical appearance of optic atrophy and optic neuritis.

11. *The Ears.*—Do not mistake a deafness or a vertigo caused by middle-ear disease or by cerumen for the result of cerebral disease. Even loss of hearing by the bone does not always point to central trouble, but may result from impaction of the stapes.

12–16. *The Pulse, the Heart, the Lungs, the Abdomen, the Temperature, and the Organs of Reproduction.*—The study of these branches need not be discussed here. I would only observe, regarding the *pulse*, that its character should be noted as well as its rapidity, also, that the condition of the arteries (tortuous or beaded) should be observed. Note the temporal as well as the radial artery. Do not forget that nervous excitement may carry the pulse up to 120, or even higher, especially in persons of a nervous temperament. Do not mistake a pulse of this variety or the rapid pulse of neurasthenia for the rapid pulse of organic spinal disease; the latter does not generally run much over 90. Look, rather, for an enlarged thyroid and prominence of eyeballs in these extremely rapid pulses, else you may mistake an exophthalmic goitre for a simple neurasthenia.

17. *The Urine*.—Note the specific gravity and reaction, not simply as a matter of formality, but bearing in mind the fact that the uric-acid diathesis often gives rise to troublesome nervous symptoms, which will disappear on a generous use of lithia water or citrate of lithia. Remember that in exceptional cases the presence of albumin or sugar, as also marked changes in quantity and specific gravity, may be the result of a cerebral tumor.

18. *External Signs*.—Look for cicatrices and for depressions in the skull, avoiding the common error of mistaking a natural for an unnatural depression. Look for eruptions, and familiarize yourselves as far as possible with their varieties. Look for enlarged glands, especially cervical and cubital.

The result of our examination of both illustrative patients is negative in all these respects excepting those noted, and excepting that the case of suspected brain-tumor has the remains of a marked double optic neuritis. We are left, therefore, with a simple case of migraine, on the one hand, and a deep-seated tumor of unknown origin in the left hemisphere, on the other.

TABES DORSALIS.

CLINICAL LECTURE DELIVERED AT THE YALE MEDICAL SCHOOL.

BY JAMES K. THACHER, M.D.,

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GENTLEMEN,—The first case that I shall show you is Mr. B. L., age fifty-two, railroad conductor. His father died of "old age" at seventy-seven, and his mother of cerebral hemorrhage at sixty-five. He had an attack of measles when he was nineteen, and a light attack of gonorrhoea a little later. He denies any other venereal disease. At the age of thirty-eight he was caught between the buffers of the cars and badly squeezed in the lumbar and lower thoracic regions, but went back to work in ten days, and there seemed to have been no bad effects left. In all other respects up to about the time when his present disease began he has been healthy and escaped violence. When he was forty-one he was exposed to rain, remained in his wet clothes all day, and caught a severe cold. Shortly after this he noticed numbness and formication on the outer side of the dorsum of each foot in the region of the toes. There was then no incapacity in using his legs except that he did not feel quite sure of his footing in getting on or off the cars; a month or two later, however, his legs were "weak," and they gradually became more so, and three months after the first symptoms were noticed he had shooting pains in the legs, especially just before a storm. A month later he had a distinct girdle sensation, sometimes very tight, and a tight feeling in the calves, and at the same time first noticed difficulty in making water. Seven months after the first symptoms appeared he was examined by a physician, who found that his knee-jerks were absent and that there was some failure of tactile sensibility. About three years after the beginning of the disease his eyesight became dim and he had double vision with marked ptosis of the right eye. The girdle feeling, difficulty of micturition, constipation, absence of sexual desire (for eighteen months) and almost complete impotence, absence of knee-jerk, and the presence

of Romberg's symptom with well-marked ataxia were noted at that time.

Three years later, again, the ataxia had increased so that he was unable to stand, and there was some ataxia of his upper extremities, although he could feed himself. He still had lancinating pains and difficulty in getting his water started. The ptosis and diplopia had disappeared. There was some amblyopia; pupils equal and normal in size, but they did not contract to light, although they reacted on accommodation (Argyll-Robertson pupil). Gastric crises had occurred once in a week or two for some months. The tactile sense had diminished in the legs, and there was some polyæsthesia along the front of the thighs. There was also delayed sensation.

A year later there is reported occasional gastralgic attacks without vomiting; no diplopia or ptosis; Argyll-Robertson pupil; slight difference between the pupils; no myosis; knee-jerks, of course, absent; some delayed sensation and some polyæsthesia on the front of thighs; some ataxia of arms; some muscular atrophy in forearms and hands, most marked on the left side; some annoyance from cystitis.

In reviewing the symptomatology you will notice that the first thing which attracted his attention was numbness in his feet, quickly followed by slight ataxia, lancinating pains in the legs, girdle sensation, and difficulty in getting his water started. At what time the knee-jerks were lost does not appear, as he did not seek medical advice until he had been ailing some months. When the test was made at the seventh month they were absent. There could scarcely have been any doubt about the diagnosis after the first month or two. The onset is a fairly typical one; the ataxia secured attention perhaps a trifle early.

I wish to speak of some of the symptoms in detail. First, the loss of the knee-jerk. The diagnostic value of the knee-jerk, or contraction of the quadriceps extensor on percussion of the patellar tendon, was first pointed out independently by Westphal and by Erb in 1875 in the same number of the *Archiv für Psychiatrie*. The difference of opinion as to its nature, which has ever since obtained, was represented in these two papers, Erb regarding it as a reflex, and Westphal as the result of direct stimulation of the muscle. It is, however, positively proved that a reflex nervous arc, of which the sensory and motor filaments run in the anterior crural nerve, and of which the centre is located in the spinal cord from the second to the fourth lumbar segment, is involved in the phenomenon; and that the integrity of this arc is necessary to the production of the knee-jerk, and that the condition of the reflex

centre determines the extent of the knee-jerk and may itself be determined by influences coming to it from other portions of the nervous system. The phenomenon looks at first sight plainly like a reflex act, and the objections to considering it this, based entirely on the shortness of the time consumed, have never seemed to me adequate. The alternative view, however, is that through the agency of the nervous reflex arc the muscle-irritability is so heightened that the sudden stretching of the muscle-fibres evokes their contraction. Into that physiological question it is not appropriate for me to go further here.

The knee-jerk is almost invariably present in health. You must, however, make the examination with due care. The knee must be bared and the thigh supported on your wrist or hand. The percussion is best done with this triangular india-rubber hammer, known as Taylor's hammer. Numerical estimates of the frequency of its absence in health vary somewhat. Berger examined 1499 healthy persons, 900 of whom were soldiers, and found it absent in 1.56 per cent. Eulenburg's figures are much higher, about 5 per cent. Bloch, in 694 children, found it absent in 3 boys and 2 girls, considerably under 1 per cent. Pelizæus (1883) examined 2403 children from six to fourteen and found only one in which there was persistent absence. There were six in whom he failed to get it at first,—i.e., about one-quarter of one per cent. Varying as these figures do from a small fraction of 1 per cent. up to 5 per cent., they give you a tolerably distinct idea of the frequency of the absence of knee-jerk in health.

It was pointed out in 1883 by Jendrassik that, if the hands were clinched at or just before the moment of striking the tendon, the reaction is normally increased. The same effect is produced by other muscular acts, sensations, or mental acts. This is called the reinforcement; it is normally present in varying amount, and is of some clinical importance.

In tabes the knee-jerk is almost universally absent. This absence is sometimes called Westphal's symptom. These are severe cases, especially when the head symptoms are prominent and the leg symptoms ill developed, in which the knee-jerk is, for a time at least, present. In a case of this kind I have seen it come and go again, but after a few months it disappeared forever. Weir Mitchell calls attention to the excessive reinforcement which may be present in these exceptional cases of tabes with retained knee-jerk.

The question has very naturally arisen as to whether, at a period preceding the diminution and loss of the knee-jerk, there might not be an increase. This is difficult to determine, because the time at which

it must occur, if it occur at all, is ordinarily previous to anything which would attract the attention of the patient. But accidental observations and indirect evidence would lead us to strongly suspect that, in many cases at least, the loss is preceded by an exaggeration, slight or marked, of the knee-jerk. Norris, in 1885, found the knee-jerk increased in eighteen out of thirty-seven cases of more or less pronounced atrophy of the optic nerves. These were regarded as probably cases of incipient tabes. Some of them afterwards fell below normal. Increased tendon-reflexes in the arms of tabes patients have been recorded. The increased reinforcement above referred to seems to point in the same direction.

A second prominent symptom of tabes is pain. The pains are most frequently severe and shooting, usually deep, as in this case, but sometimes referred to a limited portion of the skin. They usually come on in paroxysms, and they often appear to be affected by cold, stormy weather. Besides these there may be burning, boring pains and often dull rheumatoid pains. They are most frequently experienced in the legs, but may occur in the arms, the head, and the trunk as well. They also are an early symptom and diagnostically a very important one.

A third prominent group of symptoms is formed by those which concern the eye. The iris exhibits loss of pupillary reaction to light in many cases, in most retaining meanwhile the reaction to accommodation. This state is known as the Argyll-Robertson pupil, from Dr. Argyll-Robertson, who (in 1869) first described it as a symptom of tabes. The loss of the pupillary reflex to light appears to be absent in about eighty per cent. of the cases. The pupillary skin-reflex, dilatation of the pupil on stimulation of the skin, is also very frequently absent. It is most conveniently obtained by stimulating the skin of the back of the neck with the faradic wire-brush. In this patient we are unable to obtain any contraction of the pupil from light, though the contraction on accommodation is well marked, passing from four-and-a-half to two-and-a-half millimetres, as measured by the card catheter gauge. Myosis is slight or absent. The pupillary skin reflex is not present. The pupils are not of abnormal size. In many cases, however, they are much contracted, as in a case which I shall show you presently. An ordinary card catheter gauge answers excellently for a pupillometer. The exterior muscles of the eye also frequently exhibit some paresis. In this case we had quite marked ptosis and homonymous diplopia, but they passed away early and have never returned. This is the usual history of these early pareses of the ex-

terior muscles. Complete and permanent paralyses may, however, be observed, and are then in most cases comparatively late phenomena. Atrophy of the optic disk occurs in a considerable fraction of tabetic cases. Gowers estimates its frequency as somewhat less than ten per cent. The subjective symptoms begin with contraction of the visual fields and loss of color-sense. Central acuteness of vision may, however, be impaired early.

CASE II.—J. W. F., Jr., aged fifty-two. The patient's memory is somewhat impaired, but his history, as follows, seems to be reliable: In his early twenties, after having worked very hard, with little sleep and with great exposure to cold and wet, in a livery stable, he had, while he was about his work, what he calls a "shock." He fell down; was not insensible, but could not "use himself." He was in bed a week or two; his arms were somewhat affected, but he could feed himself. After this he was always on crutches, but he showed continual improvement for some years in the control of his limbs. Some years after the shock he began to have lancinating pains in his legs, arms, and shoulders. A little later he was troubled with diplopia. There is no history of ptosis. His double vision has been absent for a long time.

On examination of his present condition we find decreased sensation in the legs and arms, with algesia delayed on the legs and arms but prompt on the face. There is delayed thermæsthesia below the knees, but it is not discoverable in the arms. The delay of pain- and temperature-sensations is from one to three seconds. He has been subject for some time to severe gastralgic attacks without vomiting. His pupils are very much contracted. This *myosis* is a frequent feature of tabes. There is very marked ataxia in the legs, as you see when he tries to touch one knee with the opposite heel, and there is similarly a certain incoördination of movement in the hands, as you see when he tries to touch his nose. He is losing some control of his water at present. It stops suddenly and then begins again. He has never had trouble in micturition before.

The early history of the case is very peculiar, and it is impossible to determine its details or how far it was related to the tabetic history of later development. This patient denies all history of or even exposure to syphilis.

CASE III.—This third case (S.) is of shorter duration. It began, as far as the man is aware, about three years ago. He presents ataxia to the extent of not being able to walk without assistance, lancinating pains, girdle sensation,—i.e., the feeling as if a tight band were bound

about his waist,—numbness in the hands and feet, amblyopia, diplopia (which began to trouble him a year ago and has affected him ever since), very much diminished reaction of the pupil to light, reaction on accommodation, no ptosis, numbness of hands and feet. He states that twenty-five years ago he had what his physician called a chancre. His sexual desire, which had been excessive, has entirely disappeared, and he seems to be impotent.

I may now say a word or two with respect to the pathology of tabes dorsalis. The lesion seems to be a primary degeneration of nerve-substance in various localities. This is followed up by replacing hypertrophy of the sustentacular tissue, neuroglia, or connective tissue. It is therefore called a sclerosis. These degenerations have been found in the following situations: the posterior columns of the cord, with especial early preference for the columns of Burdach in the lumbar region and the columns of Goll farther up; the posterior horns of gray matter; the fibrous nervous net-work in the columns of Clarke, though the cells of the latter have been reported as apparently intact.

There is also described (Jendrassik, Strümpel) degeneration of the fibres of the central cortex, such as occurs in dementia paralytica, but especially in the hinder portions of the brain. It is most marked in the outer stratum of the cortex, that of the tangential fibres. There may be degeneration of the optic nerves, and of the ordinary sensory nerves. Argyll-Robertson pupil and Westphal's symptom in cases where neither the motor nor the sensory nerves seem to be involved would lead us with some confidence to assume degenerations in the central mechanism, perhaps in the local nerve net-works.

The posterior roots of the spinal nerves are sometimes degenerated, sometimes the direct cerebellar tract, sometimes the fibres of the cerebellar cortex. In addition to these are cases, such as the first patient, where the anterior horns and motor nerves and muscles are to some extent involved. I am speaking of tabes in the strict sense, and not of Friedreich's ataxia, combined sclerosis, or tabes united with dementia.

Wide-spread over the nervous system to this extent (and doubtless farther) are the lesions of tabes. It is not a simple sclerosis in the posterior columns of the spinal cord. We recognize how extensive is the trophic interdependence of parts of the nervous system, and the fundamental question seems to be how far the various lesions are primary and how far secondary. Jendrassik seeks to interpret all the various lesions as the results of a primary lesion of the cerebral cortex. But the specific trophic relations involved do not seem to most to be

established by evidence, and the view ordinarily taken is that, while some of the lesions may be secondary, as of Goll's columns or those of Burdach, it is probable that the conspiring causes of tabes affect primarily many and scattered portions of the nervous system.

What are these causes?

Fournier first (1876) called attention to that etiological factor which alone can be shown to be real. He announced that a syphilitic history could be shown in 91 per cent. of his cases. Gowers's observations indicate between 60 and 80 per cent. Erb found a syphilitic history with secondary symptoms in 62 per cent. of the cases. Strümpel found syphilis definitely proved in 61 per cent., and, if he had admitted cases with a primary sore, but who could give no account of secondary symptoms, his percentage would have risen to about 90. Women in the lower classes are more liable to tabes than women in the upper, as they are to syphilis. The recognition of the etiological importance of syphilis seems to be at present growing in the profession.

In the three cases which I have shown you one gives a history of chancre; the other two deny syphilis most positively, though one admits a gonorrhœa which did not give him any trouble. The third, who denies any possibility of exposure, has a curious node on one rib, a large hyperostosis at one elbow-joint following fracture in early youth, but no other lesions which could be forced to do service as vestigia. This will show how difficult it is to get evidence on this point.

The syphilis is frequently, perhaps usually, of light grade. The time from the syphilitic infection to the beginning of tabes varies from two to twenty years or more. The statement seems warranted that previous syphilis, if not a necessary condition of the development of tabes, is present in a very large fraction of the cases.

The tabetic lesions, however, are not ordinary syphilitic lesions, for not only is there nothing in the histology of the diseased structure to suggest either gumma or syphilitic endarteritis, but also the reaction to potassium iodide and mercury, if ever it seems to be of value, has certainly no such unquestionable efficiency as in ordinary luetic lesions. We are forced to consider that the metabolism of the body may be so changed by antecedent syphilis that the composition of the blood becomes inimical to various portions of nervous tissue.

Trumatism involving severe concussion appears to develop some cases, though the causal relation is difficult to prove. Exposure to cold and wet, overexertion, acute rheumatism, typhoid fever, and the abuse of alcohol, are among the causes here and there assigned to individual cases.

About ten men are attacked to one woman. A considerable majority of the cases begin between the ages of twenty-five and forty-five. A case has been reported as early as ten. Gowers reports one beginning at sixty-six.

The disease is ordinarily progressive, but stationary periods are not very infrequent, and there is occasionally some improvement in symptoms. A very few recoveries are recorded. The disease may last for years, and often for decades.

There is no treatment which produces any considerable amount of cure. It is probably beneficial to use an antisyphilitic treatment for a time, especially in those cases where syphilis is known to have existed. Nitrate of silver has some testimony in its favor. It was used in the first of the cases which I have shown you, without perceptible effect. The constant current through the spine, another recognized therapeutic measure, was also used, with similar lack of result. Pencilling with the faradic brush has been thought to be useful. The pains may be relieved by morphine. The second case got the greatest relief from one-grain doses of phenacetin. Suspension from the head and shoulders as for the application of a plaster jacket was used in the third case. His experience represents what you may fairly expect. On February 5, 1890, he was twice suspended for one minute. On February 7 this was repeated. On the 9th the suspension was a little longer. The patient said he felt much better; he walked without pain and without crutches, and said he had not felt so well for three months. The suspensions were continued for a little over a month, when they were dropped because they did not seem to be effecting anything. No permanent result seems to have been obtained.

HABIT IN REFERENCE TO SLEEP AND SLEEP-LESSNESS.

WRITTEN EXPRESSLY FOR INTERNATIONAL CLINICS.

BY A. W. MACFARLANE, M.D., F.R.C.P. (EDIN.),

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To assert that every man possesses a habit of body peculiar to himself is to state a truism. Many men have habits so much alike that they may be classed in groups, but they each and all present some characteristic peculiarity. Habit is subservient to the economy as that is constituted by inheritance, modified by environment, and by innumerable circumstances incident to existence. It is therefore obvious that the personal equation must determine intrinsic distinctions, although these may be very subtle in their nature. Each bodily organ has its habit. Most are periodically active and inactive. This is less noticeable in some organs than in others. The liver, for example, that works more or less continuously at a low rate of tension, does not display these intermittent functions in a conspicuous manner, but other organs, as the glands concerned in the formation of digestive fluids, exhibit them in a high degree. The latter work at high pressure, and in the intervals they become quiescent. During activity, they attract an increased blood-supply, their temperature is raised, they expend their energy, and their cells are altered structurally. During inactivity, they become bloodless, their temperature falls, and their cells undergo constructive changes that energize them for the recurring period of activity. When these functions are performed with vigor and completeness, digestion is adequately effected, and the habit of digestion is said to be "strong." When they are discharged inefficiently, digestion is inadequately accomplished, and its habit is designated "poor." When the usual digestive habit is altered, it is generally in consequence of pathological derangements. The digestive habit may exhibit anomalies; these are determined by personal idiosyncrasies.

In the nervous system periods of marked activity alternate with those of inactivity, these correspond to the waking and sleeping states,—states that are indicative of the condition of the brain. When the cerebral structures that function thought are vigorous during waking, the psychical cells work at high pressure, and attract a full blood-supply. Mental operations so effected stamp the man with individuality and power. Conversely, textures that are feeble discharge their functions imperfectly, and the resulting condition is one of incapacity. When waking has continued sufficiently long, the fund of nervous energy is lowered, and coincidently activity wanes, and sleep—its complement—ensues. Sleep, then, is dependent in an equal degree on the quality and condition of the brain-textures ; these determine the depth and duration of sleep. While they are inactive sleep continues.

The requirements of the cerebral tissues vary vastly during the periods of growth, development, maturity, and decadence, in the opposite sexes, and in those with dissimilar constitutions and temperaments. Hence the depth and duration of sleep (which exists *pro rata*) differs accordingly. A man, whose textures can (in sleep) assimilate nutrition, build up energy, and eliminate waste products quickly, requires, and gets, less sleep than one who effects these processes slowly. As in digestion, so in sleep, idiosyncrasies are met with. Some men can maintain their vigor and health throughout life with an amount of sleep that would be quite inadequate for the majority of people. These are exceptional cases. On the other hand, some indolent persons attain the habit of sleeping an unlimited time. To this class belongs the traditional angler who, being told that the day was unsuitable for fishing, requested his servant to call him next morning.

Nervous textures, being plastic, may have their functions modified by conditions that influence them. For instance, the higher faculties may be developed by education and the lower subordinated by self-control ; inherited or acquired proclivities may thus be subjugated and replaced by others. Many mental operations of life are performed unconsciously, and attract no attention ; the brain being engrossed with other duties. Many difficult and complicated muscular movements, which were hard to master, may after frequent repetition be executed almost automatically. These are habits of the psychical and motor cells. Sleep, also, is a subconscious act, and is capable of being modified by many circumstances.

Habit enables a man to sleep in almost any or every condition, and when the body has become subordinated to these—maybe novel conditions—they become essential for sleep. Many persons have found it

difficult to obtain sleep in the desert, with its multifarious noises and discomforts, but when they have become habituated to their surroundings, they can sleep there much more soundly than in the luxurious bed of an English home. Some Indians, accustomed to sleep with their heads bound up in Manchester cloth so firmly as to be almost asphyxiated, cannot sleep without this seemingly undesirable aid. Men who in youth and middle age accustomed themselves to rise early, find it impossible to abandon the practice in advanced years. Such habits are ingrained into the textures; they become part of the man. This is noticeable in other bodily functions. The pulse-rate that normally rises with the ingestion of food, becomes quickened at meal-hours, although no food be taken (E. Smith); and the rise and fall of the bodily temperature may be inverted in those who work by night and sleep by day (Wunderlich). There is a habit in the course of sleep; its depth varies considerably during the same night. It is deepest about an hour after its onset, and its depth is increased a second time after four and a half hours. Many diseases that appear only during sleep, true to habit, ensue always at or about the same hour; among them may be mentioned nightmare, night-terrors, sleep-walking, laryngismus stridulus, nocturnal enuresis, etc.

Habits are dominated by the bodily wants. The liver, for example, secretes bile in quantities which vary according as it is needed for the digestion of nitrogenous food. Sleep, in the same manner, is prolonged and deepened as it is required to repair bodily fatigue. The habit of sleep is often the outcome of necessity. It is manifest that nervous textures dare not slumber soundly in situations of peril, exposed to bodily danger. They require to maintain a certain degree of activity in their sleep (*i.e.*, sleep lightly) that they may be quickly aroused if need arise. When such vigilance is unnecessary, and when comfortable surroundings reduce external stimulations to a minimum, the habit of sleeping deeply is acquired. Many travellers, among them Sir Bartle Frere,¹ have recorded how speedily sleep deepens in savages under such

¹ Sir Bartle Frere relates that he asked an old headman, "Why do you remain in Natal, when you are free to go back, and have acquired ample cattle wherewith to propitiate the king?" He replied, "Here in Natal I sleep in peace with my wives, children, cattle, fowls, and mealie store about me, and when I have paid my hut-tax, no one asks me for more. I don't awake if the dogs bark. In Zululand, if the dogs barked at night, I ran and hid myself in the bush, for I did not know whether it was a message from the capital to take an ox, or a girl, or to kill me because I had been smelt out by the witch doctors." General Gordon left a sad record of habits in the journal of his sojourn at Kartoum. "If these Arabs (one's servants) are not eating, they are saying their prayers; if not saying their prayers, they are sleeping; if not

improved conditions. Conversely, men accustomed to slumber deeply find it almost impossible to keep awake even when their lives are in jeopardy, and some have been grateful to mosquitoes and other pests for aiding them in their endeavors.

For all practical purposes it may be assumed that every one has a sleep habit (however formed) that is peculiar to himself, and that all modifications of this habit portend some interference with the normal state of the health. Take, for example, a very common occurrence. Many indifferent sleepers have an occasional long and deep sleep; instead of being invigorated by it, they awake with headache, feeling "bilious," and they are cold and shivery all the following day. They soon come to realize that such sleep is abnormal and, like their diurnal sensations, symptomatic of derangement.

In practice we diagnosticate fevers from the appearances that are pathognomonic of these diseases, and from a knowledge of their natural history we can predict their course and sequence. We recognized in this that the economy behaves in a somewhat uniform manner under similar circumstances. Each specific poison has an affinity for some particular part of the economy. In typhus, the effects are most felt by the nervous system, consequently sleep is usually much interfered with in that disease. Different pathological states give rise to different kinds of sleeplessness. Sleeplessness that occurs in connection with the various fevers preserves, to a greater or less extent, its main features, though it is always modified by the personal equation of the patient. For this reason, the special characteristics of a sleepless habit go far to elucidate the cause that originates it. I may illustrate this statement from my case-book. I was recently consulted about two girls (sisters) whose rest was broken without any obvious reason. The one, who was florid and healthy-looking, could not get to sleep at night; but when she did, she slept fairly well, dreaming only a little. During the day she sometimes had a headache. The diagnosis pointed to cerebral activity,—probably from cerebral hyperæmia. Examination showed that she was hypermetropic. Suitable glasses were prescribed; she lost her headache and gradually regained the habit of falling asleep quickly. The other girl, whose complexion was sallow and earthy, got to sleep easily, but awoke at 3 or 4 A.M. to lie awake till seven o'clock, when she again slept for an hour. This habit of sleep pointed strongly to some toxic cause, and her muddy skin ren-

sleeping, they are sick. One snatches at them at intervals. Now figure to yourself the position; you cannot do anything with them while in these fortresses eating, saying prayers, sleeping, or sick, and they know it."

dered the diagnosis more likely. The history showed that some years previously she had suffered from malarial poisoning. Quinine was ordered, and within a week she slept quite well.

It is beyond the scope of this paper to discuss the diagnosis of insomnia in detail. I am at present concerned to indicate that different sleepless habits depend on different causes, and so to suggest that sleeplessness is far from being an erratic symptom. Those who suffer from erethistic conditions of the brain invariably experience difficulty in falling asleep. It matters not whether the activity be maintained by the excessive use of tea or coffee, or by such diverse causes as cold feet, acute dyspepsia, mental worry, etc.: the result is the same. The habit of sleeplessness is different when it occurs as a symptom of neurasthenia, hypochondriasis, etc. The subjects of these affections fall asleep easily, and awake in two or three hours, usually when the first deep sleep is over, and lie awake for two, three, or more hours before sleep returns. The sleeplessness which pertains to gout, malarial poisoning, alcoholism, etc., commonly occurs at a later hour in the morning.

The practice of studying closely the habit of wakefulness is very useful. Does he fall asleep quickly? When does he awake? Is this wakefulness accompanied by restlessness, discomfort, or unpleasant sensations? are some of the questions that require consideration. It is advantageous also to consider if the assigned cause of sleeplessness really explains the particular variety of sleeplessness. For instance, when a man complains that he is awakened every morning by the chirping or singing of birds, it is well to make sure that this habit does not, in reality, depend on the excessive use of alcohol or tobacco. When sleeplessness crops up in the course of a disease it is necessary to decide whether it is due to the affection, or to the recrudescence of a bad sleep habit. To this point I shall return immediately. Again, when a patient finds that his sleep is disturbed unduly by a hypersensitiveness to external stimuli, it is important to remember that an increase of neurasthenia, or an accession of the gouty and rheumatic states, are frequently so preluded.

Sleeplessness may arise in persons in health from bad habit alone. Nurses often suffer in this way. They sometimes curtail their sleep unduly, to find, when their services are no longer needed, that they cannot sleep. Their brain-cells have acquired the bad habit of maintaining their activity when they ought to be reposing. It is interesting to note how such bad habits are formed. I have, on more than one occasion, been consulted by persons who ascribed the onset of their

wakefulness to a robbery. They began to awake night after night, and to lie listening for sounds, until they acquired a sleepless habit.

Various diseases cause sleeplessness in a certain class of patients; in others they give rise to an entirely different train of symptoms. This is determined by the vulnerability of the nervous system. In the recent epidemic of influenza, the symptoms were largely biased by the constitution of the patient,—the disease attacked the weakest part. In many the symptoms were referred chiefly to the thorax, in others to the gastro-intestinal tract, in some the nervous system was specially affected, and sleeplessness prevailed to an extent that could not be explained by the quickened pulse, high temperature, etc., but appeared to be determined by the disease itself. If weakness be once established by any disease, the part is liable to take on diseased action under similar conditions. This is noticeable in the tendency that catarrhal affections, erysipelas, and like disorders have to recur. The habit of aborting depends on pathological conditions that are prone to reappear at certain stages of gestation. Sleeplessness initiated by an exciting cause is apt to return whenever this comes into operation again. It may, and often does, disappear with the removal of the cause, but it does not uniformly do so. The bad habit once established may persist. It is generally known that neuralgia of the fifth nerve, dependent on a decayed tooth, may continue after the tooth has been extracted, and that ovarian neuralgia continues long after the ovaries have been extirpated. The well-marked nervous and vascular disturbances that attend the menopause are aggravated month by month at the periods that menstruation would naturally have appeared, and this may go on for years. A fit in a child, caused reflexly by worms, may recur after the worms have been expelled, and this to the extent of establishing an epileptic habit. Sleeplessness tends to persist, and to recur in precisely the same manner. It generally preserves the characteristic habit that pertains to the disease that originated it.

All neurotic diseases exhibit paroxysmal tendencies. Epilepsy reappears from time to time, and commonly maintains its nocturnal or diurnal proclivity. Migraine, asthma, hysteria, hypochondriasis, etc., which, like sleeplessness, are symptoms of nervous disorders, show a periodicity more or less regular in its nature. These affections may be excited by trivial causes; chiefly by those that tend to exhaust nervous energy. The disorders of sleep evince the same predisposition to recur from time to time under the influence of trifling exciting causes. Many intractable cases of idiopathic (?) sleeplessness are due solely to the habit of recurrence. The bad habit once acquired is, like many

other bad habits, difficult to eradicate. Habits of drinking or of taking narcotics to produce sleep are difficult to subjugate. For a time they may be subordinated by volitional effort, but, when they seem to be extinguished and vigilance is relaxed, they are apt to reappear. Such habits become part of the constitution, and they are capable of transmission to the offspring. A bad sleep habit may be so transmitted, particularly through the female, and to the younger children.

The onset of such recurring forms of sleeplessness may be gradual. The patient may dream and then grow wakeful, from night to night, until pronounced sleeplessness is established. Such a sequence is common in neurasthenia, although it is not constant. The habits of dreaming and of sleeplessness are separate habits, and not modifications of the same habit. Great dreamers are often long sleepers, and many afflicted with insomnia do not know what dreaming is.

In distinguishing between the sleeplessness due to disordered conditions and that arising from bad habit, it is advantageous to consider the nature of the sleeplessness in connection with the patient's present state, as well as in connection with his past history, and the peculiarities of his temperament and constitution. A critical inquiry into the waking condition frequently throws much light on the nature of insomnia. Cerebral life is continuous; the nocturnal state is complementary to the diurnal; it is unusual for the former to be perturbed without the latter evincing signs of disturbance.

The treatment of a bad sleepless habit is, I believe, best effected in three ways. (1) A good habit of sleep should be sedulously cultivated. It consists in falling asleep without delay, sleeping soundly for a sufficient time, and in awakening refreshed, quickly and completely. The essence of habit being repetition, the very act of going to bed regularly night after night under similar conditions, tends to engender sleep. Going to bed early has been lauded; regularity is of much more consequence. Sleep is often more prolonged when it is obtained before midnight, as it is apt to be curtailed in the morning by light, noises, etc., incident to the bustle of daily life. It is necessary to arrange the patient's regimen on a physiological basis. A good day's work completed, and repose earned, implies a mental condition that is capable of exercising "the power of resolution over disease." On lying down it is necessary to abandon one's self to sleep. We cannot hope to sleep if we continue to think, and one of the surest ways of not sleeping is to try to sleep. We are often able to resist sleep and to keep awake, but every mental effort prevents sleep. The habit of sleep is best cultivated in youth, when the nervous textures are plastic. It is much to

be desired by those who have sensitive nervous systems, or who have a proclivity to sleeplessness. When such persons acquire it, it lays the foundation of future happiness, for in middle life they will sleep well, and be able to bear prosperity and adversity without undue elation or depression. A bad habit requires to be eradicated and to be replaced by a good one. Every one knows how much more difficult it is to unlearn a wrong way of doing anything than it is to learn the right way at once. Perseverance is therefore required. It is much more easy to gain the habit of falling asleep than it is to get rid of a habit of awakening.

(2) Change of air is a valuable aid. Climatic conditions exert a very great influence on sleep and sleeplessness. The most suitable place must be decided in each individual case. The seaside renders many such persons more wakeful, while a sea-voyage may suit these same patients admirably.

(3) Hypnotics are specially useful. Carefully administered, so as to avoid forming a habit of drug-taking, they are invaluable. They must not, however, be given continuously. To overcome a defective habit of falling asleep I prefer paraldehyde in full doses. It acts quickly and efficiently. For the habit of waking at two o'clock in the morning I value sulphonal highly, as it acts slowly. The dose of the hypnotic selected should be adequate. It must be varied in reference to body-weight, sex, and temperament.

CHRONIC MENINGO-ENCEPHALITIS, COMPLICATED WITH LEAD-POISONING; JUVENILE OR HEREDITARY ATAXIA.

CLINICAL LECTURE DELIVERED AT THE RUSH MEDICAL COLLEGE, CHICAGO.

BY HENRY M. LYMAN, A.M., M.D.,

Professor of Theory and Practice of Medicine in the Rush Medical College;
Physician to the Presbyterian Hospital, Chicago.

GENTLEMEN,—The patient whom I now place before you will serve to illustrate some of the difficulties that beset the diagnostician, and will also furnish an example of the complicated forms in which disease may present itself. He is an American, thirty-three years of age, a painter by trade, having followed this occupation quite constantly during the last ten years. He has been married for thirteen years; was gifted with an unusually vigorous sexual appetite, which was indulged without stint for a number of years. About nine years ago he contracted the habit of drinking, and for three years was almost constantly the worse for whiskey. At the expiration of this time he partially reformed himself, and since then has not taken liquor more than once or twice a week. For fifteen years he has chewed tobacco and smoked occasionally. He is also fond of strong tea and coffee, always having a cup of one of these beverages with every meal.

The father and mother of the patient are both living, as also three sisters and a brother, all in excellent health. I can discover no history of any noteworthy illness among those members of the family. As for the earlier generations of the stock, no history can be obtained.

About eight years ago, two or three weeks after intercourse with a lewd woman, the patient discovered a slight vesicular eruption on the glans penis, but it disappeared after three or four days, and was never followed by any cutaneous eruption, nor by any of the outward manifestations of syphilitic infection. Several months afterwards a similar eruption took place without any previous connection, and it disappeared in like manner without any evidence of constitutional infection. You may remark that close questioning on this point elicits no addi-

tional information, and the patient seems inclined to aid us without any reservations as to his past life.

For a number of years he has suffered, at irregular intervals, with abdominal pains, attacks of colic, occurring on an average of once a day, and lasting about an hour at a time. Two years ago he had an unusually severe attack that "drew him up right across the belly," as he says, and continued for thirteen hours. Three days later he had an "attack of diarrhoea," but he is unable to tell us whether it was genuine intestinal catarrh, or whether it was induced by some medicine that he had taken. These colicky pains sometimes invaded the thoracic wall; they were not accompanied by retraction of the abdominal wall, nor were they relieved by pressure. The bowels were not remarkably constipated. For many months there has been in the mouth a peculiar metallic taste.

In spite of these minor ailments, however, our patient continued at work, a fairly vigorous man, weighing one hundred and sixty pounds. But on the third day of July, 1890, about two o'clock of a very warm afternoon, he was engaged in the work of painting a fence. He was perspiring freely, and "felt first rate," as he sat on a box, giving the finishing touches to the last strip of paling. His "boss" came up and spoke to him, but receiving no reply, gave him a push, and he fell over upon the ground. Then it appeared that he was unconscious. A physician soon arrived, and pronounced it a case of sunstroke. It was nearly twenty-four hours before consciousness returned. He was then brought home to the city, and two days later he found that his right side was paretic: he awoke in the night, tried to turn over, but found that he could not, because his right side was partially paralyzed. In two or three days this condition began to improve, and at the end of three weeks the paresis had disappeared, so that he could walk about as well as ever. That he had not fully recovered is shown by the fact that about the 10th of September he fell and injured his wrist quite severely. Again, about the 1st of October, he fell and strained his back; and, finally, he sprained his ankle in the same way at Thanksgiving time (November 27), two weeks ago. About two months ago his head began to ache without any apparent cause, and has ached continually ever since, the pain being felt equally in the frontal and occipital regions. He complains of diminished visual power, and pain is increased by every attempt at accommodation for near vision. Sexual appetite and faculty have been absent ever since the apoplectic seizure in July. The bladder is irritable, so that the patient must urinate several times during the night, and can scarcely contain him-

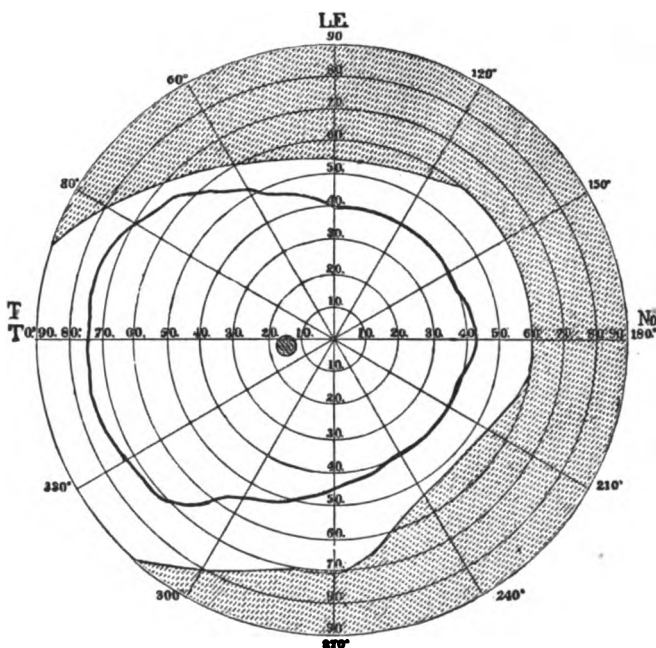
self long enough to reach a urinal when the impulse takes him during the daytime, though there is no evidence of inflammation of the urinary tract. The bowels are regularly evacuated, and exhibit no special sign of disorder.

Such, then, is the history of our patient. Let us now proceed to investigate his present condition. You can see that he is of medium height, brown hair, blue eyes, fair complexion. Formerly weighing one hundred and fifty or sixty pounds, he has fallen to one hundred and eighteen pounds. Removing his clothes, his skin is smooth, fairly healthy, and free from marks or scars. There is not, and there has not been, any loss of hair. The pupils of the eyes respond to variations of light, but the right pupil is larger than its fellow, and its changes are more sluggishly performed. He sees objects clearly; there is no double vision; but the effort of examining a small object held near the eyes provokes pain in the head. There is no appearance of weakness about the facial, oral, lingual, or faucial muscles. His tongue is nearly clean, and but little paler than the color of health. The gums are clean and healthy, there is no "lead-line" visible. Let us test the special senses and the general cutaneous sensibility; you see that they appear to be normal. We will compare the strength of his hands; the dynamometer registers 120° in the grasp of the right hand, and 90° in the left. This is a larger difference than is usually noted; in your own hands you remark a difference of only about 11° in favor of the right. The patient has always used his right hand in his work, while the left has been comparatively idle, so that some allowance must be made for this fact; still, the difference in his case is probably pathological, in part at least. There is, however, in neither arm any evidence of sufficient weakness to produce what is called the "wrist-drop." The reflexes at the elbow- and knee-joints are slightly increased; there is a suspicion of ankle-clonus. The cutaneous reflexes exhibit nothing unusual. When the patient stands erect with his feet together, there is no loss of equilibrium when he closes his eyes. After several abortive efforts, due to nervous excitement, the patient has succeeded in passing this abundant specimen of urine. As we apply the different tests, you may observe that it is of normal specific gravity and reaction, and that it contains neither albumin nor sugar. The action of the heart is rather feeble, and his pulse beats one hundred per minute. He has never complained of any respiratory disorder, and examination reveals no organic lesions of the heart or of the lungs. The dimensions of the liver and spleen appear to be normal.

That we may arrive at certainty regarding the condition of the

eyes, I have asked Dr. Charles A. Beard, of the Ophthalmological Clinic, to examine the case. Here is his report :

"DEAR DOCTOR,—At your request I have made examination of the eyes in the case of your patient, K. I find media all clear, movements normal (though he says he has, at times, *momentarily* had diplopia). Pupils are of unequal size,—right being the larger, though both respond to light (the right but feebly), and to efforts of accommodation and convergence. Vision is slightly subnormal in right, about normal in left. The ophthalmoscope shows both retinæ and optic nerves to be decidedly anæmic, retinal vessels very small,—arteries being mere threads. No other visible anomaly within the eyes. Fields of vision are both contracted, as may be seen from accompanying chart."



Field of vision of left eye, December 17, 1890.

Let us now review the causes of ill health to which this patient has been exposed. The family history, so far as it has been made known, is good. But, could we personally investigate the individual members, it is possible that some hereditary influence, of which the patient himself has no knowledge, might be discovered. We must entertain some reservation on that point. Passing, then, to the facts that have been

elicited, it is evident that this man has led a long course of self-indulgence. Two wives in the course of thirteen years; continually under the influence of alcohol during early married life, and by no means a total abstainer during the last half dozen years. Besides this he has been for many years an active consumer of those nerve-poisons, tea, coffee, and tobacco. All this abuse of the comforts of life tends to weaken the heart, the digestive organs, and the nervous system. No better preparation for the evolution of nervous disease could be desired.

Proceeding now to the more immediate causes of disease, you have been informed of a suspicious incident connected, some eight years ago, with his sexual apparatus. The history at this point is not so clear as might be desired; such histories generally are lacking in lucidity, though not wanting in lubricity. We cannot learn that there has been any observation of the usual incidents of syphilitic infection. But, the results of such infection are often imperfectly developed, and treatment is sometimes so efficient that a non-medical patient may easily believe that he has never experienced anything more than the slight initial vesicle or pustule that would have been recognized by any physician as pregnant with the most direful consequences. There, as in the matter of family history, we must allow a wide margin for contingent possibilities.

Among the remaining causes of disease to which this man has been exposed, there can be no doubt that he has been for many years under the influence of lead. He tells you that he has been a house-painter, that he has frequently had his hands covered with lead paint, that he has suffered with repeated attacks of abdominal pain, that he has been treated by various physicians who have claimed to remove lead in large quantity from his bowels, etc. The history of lead-poisoning is pretty clear, though many of the ordinary symptoms are not present. Witness the healthy condition of his gums. But, it is doubtless owing to that healthy condition that the well-known "lead line" is absent. It is not formed unless the gums are separated from the teeth by tartar or by gingival disease. When particles of animal food find a lodgement between the teeth and the gums in an unhealthy mouth, sulphur is given up by the decomposing protoplasm, and enters into combination with the lead that is brought to the part, so that a layer of lead sulphide is formed and retained in the tissues of the gum adjacent to the seat of putrefaction. Nothing of this kind could happen in a mouth as cleanly as that of our patient. We must not, therefore, conclude from the absence of a "lead line" that he may not be a victim of plumbism; nor shall we be safe in drawing a similar conclusion

from the absence of the "wrist-drop" that is often so conspicuous a feature in cases of lead-poisoning. You will remember that the dynamometer indicated a disproportionate degree of muscular power in the right hand when compared with the left. Still, there is none of that extensor paralysis of the forearm that is so characteristic of typical cases of lead-poisoning. The paretic condition of several of the ocular muscles must be taken into consideration in connection with the apparent weakness of the left arm; but even that has about it nothing characteristic or especially suggestive of lead-poisoning. The frequently-recurring attacks of colic are, after all, the most significant symptoms of plumbism that the case has yet afforded. Considering the prolonged occurrence of these attacks, and recalling to mind the obscurity that often attends the manifestation of plumbism, I think we are justified in maintaining the hypothesis of poisoning with lead. It is interesting, in this connection, to remember the valuable papers on obscure forms of such poisoning that have been published by Dr. James J. Putnam in the *Boston Medical and Surgical Journal* for 1887, and in the recent volumes of the *Transactions of the Association of American Physicians*. Still more convincing is the experience of the French in their navy. When steam was introduced as the motive power of their ships of war, a strange and unaccountable prevalence of "dry bellyache" was noted among the crews of these ships. Nothing of the kind had been previously observed, and the experience of other navies yielded nothing similar. But, in the new French ships these cases were of frequent occurrence. They were particularly numerous among the sailors on duty in the tropical squadrons; and it was for a long time conjectured that the disease must be due to some strange incidence of malaria upon these crews. It was at first suspected that lead might be the cause of the affection, but this opinion was abandoned on account of the great irregularity and obscurity of the symptoms, just as we see them in the case before you. For thirty years the French surgeons floated to and fro upon a flood of guesses, until Dr. Lefevre, of Brest, published in 1859 his epoch-making work on the causes of dry colic ("*Recherches sur les Causes de la Colique sèche*"). He showed that in the construction of a war-ship of the first class not less than fifteen tons of lead were introduced into the fabric. The employment of steam rendered easy the production of distilled water for use by the crew. This water was frequently stored in tanks that were lined with zinc. This zinc contained a large quantity of lead. The tanks were generally furnished with lead stopcocks, or with leaden pipes through which the sailors

were obliged to suck out the water when they were thirsty. To make assurance doubly sure, when the ship had reached a tropical station, it was thought to improve the health of the seamen by refreshing the water in these tanks with an addition of a mixture of rum, sugar, and vinegar. Of course the warm weather increased thirst; the mariners drank freely; and the surgeons wondered why whole crews of three or four hundred men, for whom such excellent provision had been made, should be all groaning together with the strange tropical malady so dangerous to Frenchmen.

It is worth while, in this connection, to recall the statement of our patient that for many years he has been accustomed to the use of alcoholic beverages, a circumstance that considerably facilitates the occurrence of poisoning with lead.

But, while we may feel convinced of the share that metallic poisoning may have had in undermining this man's health, we must not ascribe too much to this cause. Referring again to the defects of vision noted, the simple narrowing of his visual fields is not what usually follows the poisonous influence of lead upon the retina and optic nerve. In such cases we are told that the field of vision occupies its normal limits; the ophthalmoscope detects nothing abnormal; but a certain degree of amaurosis exists in the form of central scotoma. This is a condition of things quite different from what Dr. Beard has reported. We must therefore proceed to consider the last in the series of causes that have operated to destroy the health of the patient.

We were informed that during the very warm weather, in the early part of last July, he had a sunstroke. He was unconscious for nearly twenty-four hours, and two days afterwards was partially paralyzed upon the right side. This attack did not produce complete hemiplegia, and his recovery was rapid; his right hand and arm you have just noted are stronger than the left hand. Such is not the result of cerebral hemorrhage nor of embolism in a branch of the Sylvian artery. In certain diseases of the meninges and cortex of the brain, however, we do encounter similar events. The "serous apoplexy" of old authors was frequently attended by rapid recovery from apoplecticiform attacks. Patients who are suffering with chronic periencephalitis sometimes exhibit similar phenomena. The attacks are sometimes apoplecticiform, sometimes epileptiform in their character. A patient may appear to be profoundly comatose; one side may be completely motionless; and yet in a few days he may have recovered consciousness and the use of his limbs, presenting only the ordinary symptoms of progress towards parietic dementia.

The onset of insolation in this case was, if we may believe the patient's story, after a rather unusual fashion. He tells us that he was perspiring freely, and "felt first-rate." Ordinarily, a sunstroke is preceded by a period of impaired health, during which the excretions are diminished, the skin is dry, there are thirst and nausea, general debility, and an irritable condition of the bladder. Men in good health rarely yield to the heat of the sun. But, evidently, this patient was not in good health. He may have experienced a brief period of exhilaration, due to cerebral hyperæmia, just before the stroke, leading him to think that he was "feeling first-rate," just as we often observe a period of premonitory exhilaration a few hours before a paroxysm of headache in the victims of uric-acid poisoning. Copious perspiration, however, is unusual, though it does sometimes occur, especially during the collapse after heat-stroke.

The question that remains for consideration refers to the later experiences of the patient, after the sunstroke. Were they consequences of insolation or were they caused by lead-poisoning? It will be convenient to compare the symptoms of saturnine encephalopathy with those of the cerebral form of sunstroke. You will remember that of the four principal forms of plumbism, dry colic is the most common; muscular cramps and joint-pains rank next in frequency; then come the various forms of paralysis; while encephalopathy is the rarest event of all. We have admitted the occurrence of colic; now have we, finally, the development of the cerebral variety of the disease?

SYMPTOMS OF ENCEPHALOPATHY.

Occurs without exposure to heat.

May or may not have been preceded by other forms of lead-poisoning. Often begins abruptly with violent headache and failure of vision, followed shortly by convulsions. Coma accompanies convulsion, and is only persistent in severe and fatal cases. Albuminuria may occur, either as a consequence of convulsion or of chronic nephritis. Eye-symptoms are irregularly developed, but do not disturb the field of vision or the ophthalmoscopic picture. Mortality is very high. Post-mortem examination reveals little definite change aside from an oedematous condition of the brain.

SYMPTOMS OF INSOLATION.

Occurs during or after exposure to heat.

Violent headache, vertigo, dry and hot skin, high temperature, coma or convulsion, often followed by a speedy death. If convalescence occur, the patient remains feeble, suffers much from headache that is aggravated by heat, and especially by the rays of the sun. The heart is enfeebled and the pulse is weak and rapid; the special senses are dulled; memory and the intellectual faculties are weakened; local injury of various peripheral nerves may be discovered; and the functions of the spinal cord may be deteriorated. At the autopsy, various forms of cerebro-spinal hyperæmia or of meningeal inflammation are apparent.

So far, then, as the original attack, in July, is concerned, the individual symptoms would not be decisive,—at least with our present imperfect knowledge of what they were,—but the attendant circumstances and the subsequent events, all favor the diagnosis of chronic meningitis dependent upon insolation as the immediate cause of the condition in which the patient now finds himself. The paretic state of the right third nerve, and the ophthalmoscopic appearances point in the direction of local injuries from inflammation at the base of the brain. Such lesions, and worse, are not uncommon after sunstroke; but, fortunately, if the patient does not die, we may expect improvement, and, sometimes, recovery from them.

In the present instance, then, we have to deal with a patient in whom a predisposition to disease of the nervous system has been established by the combined influence of lead, tobacco, alcohol, and possibly syphilis. The exciting cause of his present disorder was exposure to excessive solar heat. He is now suffering with chronic, subacute meningo-encephalitis. With proper care, he may hope to improve in health, and in time recovery is possible.

The treatment of such a case is very simple, but it requires great patience and perseverance on the part of both physician and patient. We will not stop to consider the course that should have been pursued six months ago. In future, the bowels must be carefully observed, and must be guarded against constipation. The kidneys must also be made to do their work efficiently. The skin appears to be fairly healthy, and only needs stimulation with a coarse towel daily, and protection against cold and damp. The diet should consist largely of milk. Meat may be allowed with some degree of freedom, for the patient is not plethoric, and his nervous centres are anæmic. Coarser vegetables, such as cabbage, turnips, and onions will be useful as aids in maintaining a soluble condition of the bowels. If drugs become necessary for this purpose, employ the milder saline laxatives, such as Rochelle or Epsom salts, or a Seidlitz powder before breakfast. After using these for six weeks you may have recourse, if necessary, to the compound liquorice powder of the German Pharmacopœia. Finally, you may reach the vegetable laxatives, aloin, rhubarb, euonymin, colocynth, podophyllin. By derivation with these drugs, while moving the bowels, you will really be acting powerfully and favorably upon the intracranial structures.

Upon those organs you must also act directly with alterative remedies. In chronic lead-poisoning we should seek to eliminate the metal from the tissues, and also to favorably alter their nutrition. Theory

and practice unite in pointing to iodide of potassium as the agent best qualified for this double function. With the metal it combines to form the iodide of lead which is easily discharged by the kidneys. As there is a possibility of chronic syphilitic infection, we shall do wisely if we add to the other remedies a minute quantity of mercury. Few other drugs possess such power to invigorate the brain and spinal cord. Let us, therefore, commence with the following prescription :

R Hydrarg. corros. chlorid , gr. i;
Potass. iodid., \mathfrak{z} ss;
Aque cinnamomi, \mathfrak{z} vi.

Sig —Take one teaspoonful (\mathfrak{z} i) in a glass (\mathfrak{z} vi) of water before each meal.

Continue the administration of these remedies for many months. It need not discourage you if treatment should have to be prolonged for two or three years. If, at any time, the formidable symptoms of coma or paralysis should reappear, we should have recourse to mercurial inunctions. These should be repeated daily for a month. Rub into the armpits and sides of the thorax a drachm of mercurial ointment once or twice a day. If this prove too irritating, replace the simple ointment with oleate of mercury and lanolin in equal parts, as suggested by my friend Dr. Lydston, who has had large experience in the treatment of syphilis. After a month of inunction, you may return to the use of potassium iodide, beginning with small doses, and rapidly increasing their weight until the patient takes a drachm of the drug once, twice, or even thrice a day.

The question of counter-irritation must also be considered. In these chronic meningeal inflammations much benefit may be derived from the use of cups along the spine. Apply two wet cups once a week above the scapular spines until pain is relieved. Dry cups daily will be very useful, so long as pain may persist. Blisters behind the ears and across the nape of the neck often do good. They should be reapplied as fast as the blistered surfaces are completely healed,—that is, about once a week or ten days. Better still is the actual cautery, lightly applied to the back of the neck and between the shoulders. Men will seldom object to this, but you should advise it cautiously in the case of a woman, and should, in such cases, apply it low enough to avoid disfigurement of the neck.

The headaches, of which the patient complains, may be relieved by the administration of ten- or fifteen-grain doses of phenacetin. These may be repeated every four hours for a time, but should not be continued indefinitely for fear of disturbing the nutrition of the brain.

If the patient exhibits pallor of countenance, it will be well to give five-grain doses of phenacetin with one or two grains of caffeine. Bromo-soda, guarana, sumbul, elixir of the valerianate of ammonia, may all be tried before resorting to opiates. In these chronic cases opiated anodynes should be avoided for fear of establishing the opium-habit. For this reason it is well to substitute caffeine or a grain of exalgine in place of the opium in Brown-Séguard's neuralgic pill. Fortunately, however, in the majority of syphilitic and plumbic headaches the radical treatment will shortly suffice to give permanent relief.

JUVENILE ATAXY.

The next case is interesting by reason of its rarity, and because of its variations from the standard type of the class with which it should probably be ranked.

Thirty years ago Friedreich began to collect cases of a form of ataxy occurring in families, of which more than one individual was affected. The disease usually commenced between the ages of four years and twenty-four years. The symptoms consisted in a gradual loss of the power of co-ordination in the lower extremities, and finally extending to the arms. The muscles of the neck and head share in this loss of co-ordinated movement, and the movements of the eyeballs are attended with a jerky oscillation. The severe pains of locomotor ataxia are absent, and the reflexes are almost always suppressed. In other respects the course of the disease closely resembles that of locomotor ataxia.

Turning now to this patient, we find that he is a strongly-built young man of fifteen years. He is well formed, and his large muscles are very firm. His head is brachycephalic and rather conical; you notice that when he moves his eyeballs the motion is jerky. This is most conspicuous when he looks to the right, though it is also apparent when he turns his eyes upward or downward. When the eyes are at rest there is no oscillation. Asking him to walk around the arena you may observe the excessively ataxic character of his gait; it almost amounts to a stagger. This is due to defective power of co-ordination, and not to any deficiency of muscular power. The special senses, tactile sensibility, and the perception of painful impressions are all unimpaired. The deep reflexes are exaggerated. Tapping the tendon of the triceps muscle causes an active jerk in both arms; the same thing is observed at both knees, and there is an excellent example of ankle-clonus on both sides. The abdominal reflexes are rather more marked than usual. The cremaster reflex and other superficial reflexes

are normal. The patient has never suffered with any of the pains that characterize locomotor ataxia. The functions of the bowels and of the bladder are all perfect. The intellectual faculties seem to be normal, and the patient is able to speak without difficulty. His general health is excellent.

Inquiry into the family history elicits very little information. The boy is accompanied by his father, a muscular man, in good health, with a head that is shaped like that of his son. It is evidently an ancestral type. The mother is reported healthy. As for the other relatives and progenitors there is no knowledge. We, however, are told that one of this boy's child-brothers cannot urinate without the aid of a catheter. The maternal history during pregnancy with this child contains nothing out of the way; and his birth was attended by no unusual events. The baby was strong and seemed to be healthy till he was a year old, when it was noticed that he did not move his legs as children ordinarily do. As time went on, he proved to be tardy in his development. He was four years old before he began to talk, and he could not walk till he was seven. When he did learn to walk, it was after the ataxic fashion that you now witness. From that time till the present, he has, however, been gradually improving in all his faculties until he has reached the condition in which we find him. This improvement is said to have been particularly rapid during the past year, in which he has reached the age of puberty.

Let us now consider the points of resemblance between this case and the cases of hereditary ataxia described by Friedreich. The youth of the patient; the marked degree of incoördination, most apparent in the lower extremities, but also affecting slightly the upper, as you can observe when with eyes closed he tries to touch the tip of his nose with the forefinger; the absence of pain and of trophic faults; the perfect control of the sphincters; the oscillatory movement of the eyeballs in voluntary motion,—all these symptoms follow the rule. On the other hand, as variations from the classical type, we may note the early commencement of disorder,—three years earlier than anything noted by Gowers in his Manual; the progressive improvement instead of deterioration of the patient; and the exaggerated condition of the tendinous reflexes. These considerations render it doubtful whether, instead of a progressive sclerosis of the posterior and lateral white columns of the cord, we have not, in this case, to deal with a congenital defect in the nutrition and growth of the brain and spinal cord. The steady improvement, especially during the evolution of puberty, seems to indicate a high degree of probability for this hypothesis. If, on the

other hand, we admit an incident sclerosis of the brain and spinal cord, commencing at the age of one year, it is quite inexplicable how such a disease should reverse its normal course, and tend towards recovery rather than take the direction of deeper degeneration. An autopsy alone can decide these difficult questions.

The treatment appropriate to such a case can be very briefly indicated. The general health is sufficient to require no help. We must limit ourselves to the administration of such drugs as aid the nutrition of the nervous tissues. Chief among these are arsenic and the oils. Give three drops of Fowler's solution, with as much cod-liver oil as can be digested, after each meal. Iron is not needed by the blood in this instance; strychnine and nitrate of silver should not be given when the reflex functions of the cord are already exalted. After all, there is very little chance for a therapeutical triumph in such cases; so we must patiently wait for the end, hoping that time may throw additional light upon its peculiarities.

FRACTURE OF THE SPINE; COMPRESSION OF THE CAUDA EQUINA; PARALYSIS AND ANÆSTHESIA; OPERATION; RECOVERY.

CLINICAL LECTURE DELIVERED AT THE VANDERBILT CLINIC, COLLEGE OF
PHYSICIANS AND SURGEONS, NEW YORK.

BY M. ALLEN STARR, M.D., Ph.D.,

Professor of Diseases of the Mind and Nervous System in the College of Physicians
and Surgeons, New York.

THROUGH the kindness of Dr. Samuel Lloyd, of this city, I have the privilege of showing you a case that has interested us very much indeed, a case that is quite a marked one in its way, the like of which you will not have an opportunity of seeing very frequently. It is interesting not so much on account of the rarity of the trouble as of the rarity in the success of its treatment.

This man was perfectly well until Easter Sunday morning two years ago, when, while upon his hands and knees, a heavy iron pipe fell upon his back, producing an injury. You will hear of a certain number of injuries that occur in that posture, and their effects are usually pretty severe. The injury did not make him unconscious. Some one lifted off the pipe which had fallen upon him and laid him upon the floor, he being unable to move his right leg. He was taken to Roosevelt Hospital as soon as the ambulance came. There was no loss of consciousness at any time. While in the hospital he had to lie on his left side with a pillow against his back. He could not move his right leg, which was paralyzed. There was no pain in the affected limb, but only a little tingling and numbness. He could not pass water, and his bowels did not move for twelve days, after which time he had no control at all over them. There was a feeling as of a tight band tied around his right thigh. He was in Roosevelt Hospital seven weeks, and when he came out could not stand at all. His wife took him home, and placed him under the care of Dr. Lloyd, who has attended him ever since.

That is the history he has given us, and it has been corroborated by the hospital history; for on the hospital records a distinct history of this man was found and a diagnosis was entered of fracture of the lumbar portion of the spine. When the man came under Dr. Lloyd's care, there was paralysis of the entire right leg, quite complete in some of the muscles of the upper part of the leg and in all of those below the knee. All the muscles were not only paralyzed, but presented the reaction of degeneration, there being a loss of faradic contractility and a change in the galvanic reaction, the cathode-closure contraction being less than the anode-closure contraction in certain muscles of the leg. These were the anterior tibial, the peronei, the posterior tibial, and the glutei. The muscles of the front of the thigh were not totally paralyzed, and there was no reaction of degeneration. There was, therefore, reaction of degeneration with atrophic paralysis in certain muscles of the right lower extremity. I show you a picture of this man which I took in my office one year after the injury. (See Fig. 1.) You can thus see the difference between his condition at that time and at present. The girth of the right leg was one and a half inches less than that of the left. He was unable to lift his toe from the ground, as he had the typical drop-foot. The toes, acting in accordance with the laws of gravitation, there being no tone in the muscles, dropped down when he stepped; consequently he had to lift the foot higher in order to prevent himself from stumbling over his toe. So much for motion.

Secondly, in regard to reflex action. There was at that time a disturbance of the bladder and rectum, not quite as marked as, but similar to, that which he had when at Roosevelt Hospital. There was also a very great diminution in the knee-jerk. When I tapped the right knee, as I do now, there was none of that quick, sharp response that you see at present.

When we came to examine sensation, we found a very peculiar and remarkable condition. The diagram which I draw on the board (see Fig. 2) shows a peculiar area of anæsthesia. You see that this area was saddle-shaped above at the gluteal region, but below extended down on each side in such a way that on the left side the upper part of the thigh only was affected, while on the right side the anæsthesia involved the back of the thigh, and the outer side of the leg, and extended to the foot. The strip of anæsthesia widened as it extended upward from the knee. This is important to remember as a factor in diagnosis.

We find a distinction among the areas of anæsthesia caused by

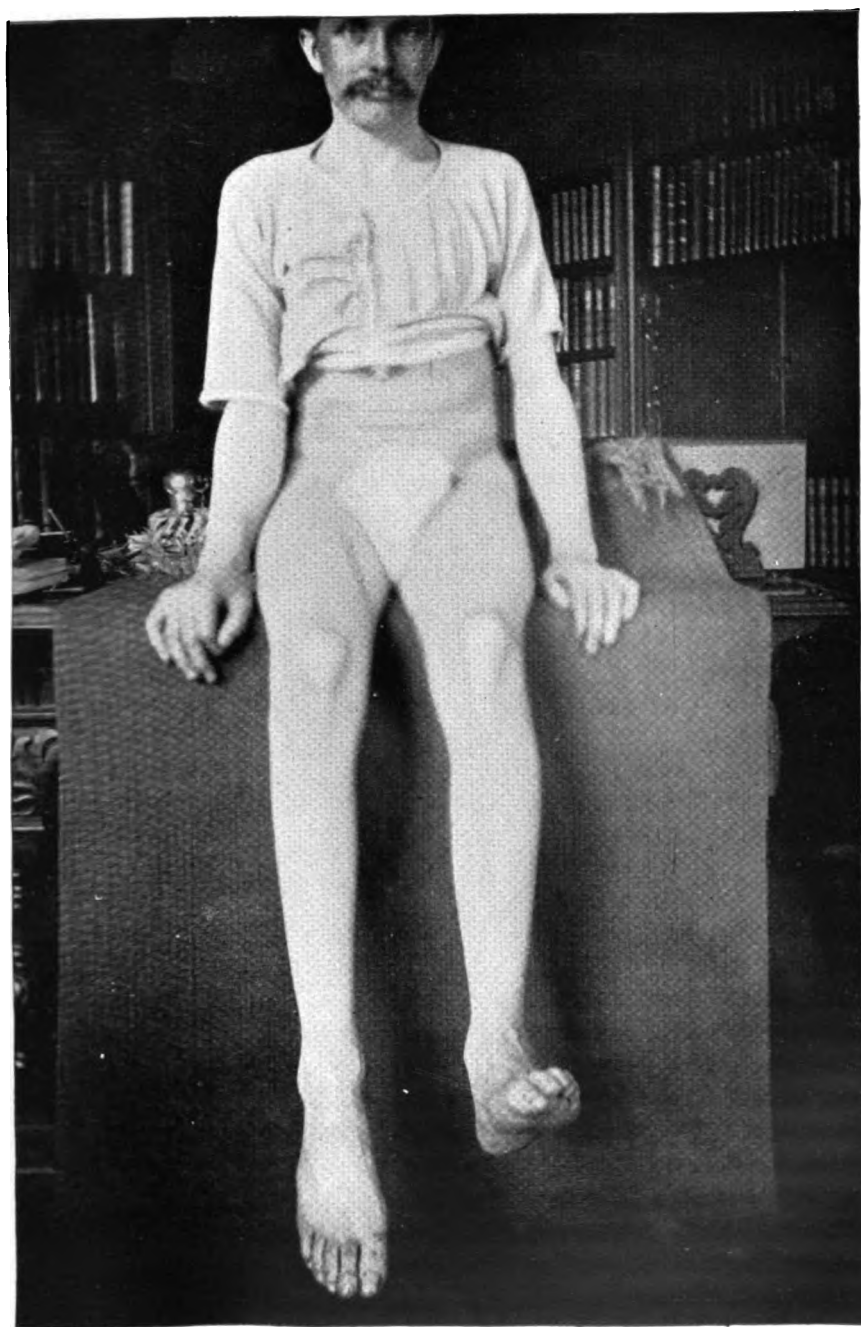
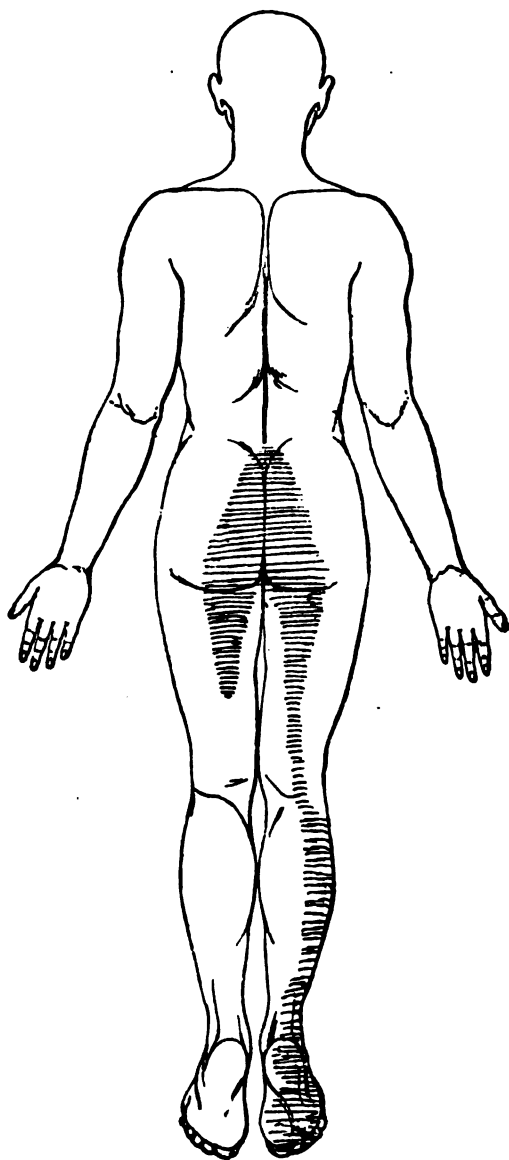


FIG. 1.—Paralysis from spinal injury. Showing wasting and drop-foot.

lesions at different levels of the cord. The anæsthesia here on the

FIG. 2.



Area of anæsthesia and analgesia due to compression of the cauda equina at the third lumbar level, chiefly on the right side.

left side corresponds to a lesion of the last three sacral segments of the cord. The area on the right side corresponds to a lesion of the last

lumbar and all the sacral segments. As you go up the different levels of the cord you will find that they correspond with different levels of the body, so that when the last three sacral segments are affected the area marked on the left side will be anæsthetic. When all the sacral segments as well as the last lumbar are injured you find the area marked on the right side anæsthetic, and as you go up the affected part will be higher and higher, till at the third lumbar segment you get an anæsthesia of the entire thigh. Now, finding this particular area of anæsthesia without absolute loss of the patellar reflex, we were led to believe that, whatever lesion this man had, it must have involved chiefly the parts of the cord below the third lumbar level. Had the lesion been above that level there would have been a much greater area of anæsthesia than is present here, and the knee-jerk would have been lost.

When we came to study the distribution of the paralysis and of the reaction of degeneration, we saw that the muscles that were atrophic and paralyzed were the muscles supplied by motor cells lying below the third lumbar segment. The bladder and rectum being supplied by the lower sacral segments, the study of the symptoms led us to believe that the lesion in the cord lay below the level of that point. When we came to examine the man's back, we found a slight deformity at the level of the second lumbar vertebra. Now, the second lumbar vertebra does not lie opposite to the lumbar spinal cord. We found a deformity in this particular region, and the symptoms pointed to the lesion of the third lumbar segment of the cord; the result was, therefore, that the diagnosis from the surgical point of view and that from the medical point of view did not agree. The third lumbar segment of the cord is opposite the spine of the eleventh dorsal vertebra. According to this the cord-trouble would not correspond with the injury.

Let us go back for a moment to anatomy for an explanation. From the spinal cord come out lumbar nerves, and, as you know very well, these nerves turn downward in the spinal canal, making what is known as the cauda equina. This injury may have compressed the cauda equina without any injury of the spinal cord. Now, such injuries have been recorded, and, taking that fact into consideration, we found that in all probability our patient had a lesion of the cauda equina, not at all affecting the cord above, but affecting those nerves at a lower level than their exit from the cord itself, a conclusion sufficiently likely because the cord ends at the first lumbar vertebra and the nerves turn down and come out at the lower levels. Pressure on the nerves of the cauda, including all up to the third lumbar nerve, would necessarily produce the same symptoms as pressure on the spinal cord at the level

of the third lumbar nerve. So that the lesion at this point made the diagnosis just as conclusive as if it were in the cord itself.

This man was a favorable case for operation, because the lesion was not of the cord itself, but of the nerve-trunks. A lesion of the cord itself would have produced destruction of the motor and sensory portion of the cord, and there would have been no hope for him. A traumatic myelitis is one of the things that is rarely if ever recovered from, but, when the pressure is on the nerve-trunks, we know from experience that, if you remove the pressure, the nerve-trunks are capable of regeneration. So it was thought well to have the operation performed, and I leave Dr. Lloyd to describe it to you.

DR. LLOYD'S REMARKS.—On the fifth of July, gentlemen, I operated on this man, making over the depressed lumbar vertebræ an incision which extended along the spinous processes, as you will see from the cicatrix present. The incision was a central one, and consequently differs from the incisions recommended by most operators. Most surgeons prefer to make two incisions, one on either side of the spinous processes. I did not do that, for the reason that hemorrhage is extremely difficult to control. The blood wells up from every point, and can be controlled, if at all, only by pressure. Two cases have died from hemorrhage from that cause. Therefore a central incision was chosen. I found that the third lumbar spine was the seat of an ununited fracture, but there was also supposed to be, from the sensation given to the finger, a depression of the right lamina of the third lumbar vertebra. The tissues were rapidly dissected away from the lamina until the articular processes of the right side came into view. A broad retractor was placed on a flat sponge over the edges of the wound, and in that way the hemorrhage was controlled. I was working in a pool of blood. The hemorrhage then was one that came from the spine. With a pair of Liston's bone-forceps I grasped the lamina of the second lumbar vertebra and snipped it off; the same with the third and fourth, so that I now had the laminæ removed from three of the vertebræ. Then I dissected away the flap on the left side until the articular processes came into view and treated them likewise. I now had the spinous processes attached to the left flap, so that the attachment of the vertebral column along the spines was perfectly intact. I was able to gnaw away the laminæ with a rongeur forceps. This method of operating with the forceps is much preferable to trephining. It is almost impossible to trephine successfully in such cases, and we are likely to so lacerate the membrane that there may be a considerable

escape of the cerebro-spinal fluid and even an injury of the cord itself. Hence nearly all operators have given up the use of the trephine and have taken to the use of the forceps. Having cut away the lamina of the second lumbar spine, I was able to discover that the cauda equina at that point was surrounded by callus, a large quantity of which was deposited in the canal. It was plain that this callus was pressing the cauda to one side. It was with considerable difficulty that this mass was cut away. However, it was quickly removed, and then, in order to make sure that all the pressure was relieved, I removed the lamina of the lower vertebra, because, if there had been a dislocation, with that arch thrown back there might be a depression. Hence, I removed the posterior arch, and I then found that the dura came into the wound perfectly well, and pulsation, which before the opening had been entirely absent, was restored. I next passed a silver probe along the canal in order to be sure that there was pressure nowhere else. I passed it three inches up and down. The dura during this procedure was injured, so that there was considerable escape of cerebro-spinal fluid. It is a serious complication to allow this fluid to escape, and therefore the dura was, of course, brought together with Lembert stitches so that it was closed completely, and no dripping away of fluid was allowed to continue. There being no longer any compression, I closed the wound, using deep sutures to draw the surfaces together. I left the spines in place. I thought they would not be in the way, and would serve to strengthen the spinal column, as the interspinous ligament was intact. They are still in position and can be felt. The man made a rapid recovery from the operation.

DR. STARR resumes.—Now, gentlemen, the result has been that this man at present has a fair control of the bladder and rectum. His sensation is still not entirely restored, but there is a considerable restoration; in point of fact he feels the prick of a pin a little everywhere. As I make these tests you see how well marked this area of anaesthesia still is. It is, of course, possible that the pressure on the sensory nerves in the cauda equina has produced an ascending degeneration of the posterior nerve-roots and of the posterior columns of the cord. If that has occurred sensation will not return. It is as yet impossible to determine this. The recovery of motion and the disappearance of atrophy you can plainly see. He is able to walk well and to raise his toe perfectly. The motor nerves compressed in the cauda equina have regenerated, and you can see the recovery resulting from that, for this man is able to get about and attend to his ordinary occupation, having

almost entirely recovered so far as paralysis is concerned. The reflex at the knee has become stronger. Of course we must not look for recovery of sensation for some time, for the sensory nerve is always the last thing to recover. We know it often takes a sensory nerve two or three years to regain its normal condition. So, here is an operation that Professor Lloyd has performed very successfully and with a prospect of complete recovery.

I have a great deal of pleasure in showing this case to you, because spinal surgery is a new departure. I showed you a case somewhat similar a year ago. It was a case of Brown-Séquard paralysis, in which Dr. McBurney operated, removing the lamina with the rongeur forceps, and found a deposit of callus at the level indicated. This he removed, which had the effect of relieving the man to some extent, but the operation was not done soon enough. The paralysis had lasted for two years, and as a result there was a degeneration without any regeneration of the fibres in the white columns of the spinal cord. The secondary degenerations produced in the cord by lesions do not recover. In the cauda equina injuries are not so liable to be followed by incurable secondary degeneration; hence it affords a better field for operation. This is one of the most brilliant results of the application of surgery to neurology. Not more than six or eight such cases have been recorded in this country, and success has not usually attended similar operations.

FACIAL PARALYSIS—"BELL'S PARALYSIS."

TWO CLINICAL LECTURES DELIVERED AT THE UNIVERSITY OF MARYLAND.

BY F. T. MILES, M.D.,

Professor of Physiology and Clinical Professor of Diseases of the Nervous System,
Maryland University.

GENTLEMEN,—I show you here a case of facial or Bell's paralysis. You will observe that the fact that all the muscles of the left side of the face are more or less paralyzed gives a blank repose to that side of the face, which is not disturbed by any effort at facial movement, or grimace, made by the patient. The muscles which move the skin of the face from the brow to the chin, including the nose and lips, and which give the varied expressions to the countenance, are all animated by one nerve, the portio dura of the seventh pair. This nerve lies in a bony canal of some length (aqueduct of Fallopius), having a sinuous course through the petrous portion of the temporal bone from the internal auditory meatus within to the stylo-mastoid foramen on the outside of the cranium. This position of the nerve is fraught with danger, for even a slight neuritis accompanied with swelling, or an effusion from the blood-vessels, on account of the unyielding walls of the bony canal, must cause pressure upon the nerve.

Now, nerves are very sensitive to pressure, and it readily disturbs their function and causes alteration in their structure; and so it happens that this seventh nerve suffers very frequently when other nerves escape, and that it is more often paralyzed than any of the other nerves. Observe that *all* of the muscles of the left side of the face are affected. Thus, you see that the patient cannot contract the brows on that side, nor close the eye, nor expand the nostrils, nor more than feebly alter the position of the lips, as in whistling, showing the teeth, etc. When an attempt is made to close the eye, the upper lid falls down a certain distance over the ball of the eye, but a wide space is left between it and the lower lid, while the ball is rolled up beneath the upper lid until you cannot see the iris. Even in sleep the eye thus remains open.

Now, this is a very important symptom, because it enables us to distinguish this facial paralysis from the much more serious paralysis of the face caused by lesion in the cerebral hemisphere, in which lesion the muscles of the brow and about the eye are spared. On one occasion a gentleman rushed into my office, and in great agitation begged me to go into the country to see his brother, who had had a paralytic stroke on one side. While I was preparing to go, he remarked that the paralysis was so extreme that his brother could not close the eye of the affected side. I paused, and, although I was unable to get further information of the case from him, I decided that it was a case of facial paralysis, and assured him that I did not think it necessary to take the journey, as it was probable that his brother was not very sick. My supposition proved to be correct.

The non-closure of the eye (*lagophthalmia*) by a voluntary effort is obviously the effect of the paralysis of the *orbicularis palpebrarum*. This it is that also prevents the patient from winking reflexly when I touch the ball of the eye with my finger, although the touch is felt as distinctly as it would be on the other eye. This paralysis of the *orbicularis* disturbs the proper adjustment of the lids, especially the lower, to the curve of the eyeball, and so disarranges the position of the *puncta lachrymalia* that they do not receive the tears, which thus run over the border of the lower lid. This overflow of tears also depends upon the want of the pumping action exerted in winking, by which, normally, they are sucked into the lachrymal canals. But why does not the eye of the paralyzed side close in sleep when the *levator palpebræ* is completely relaxed? When we attempt to close the eyes ever so gently, we are conscious that, although the weight of the upper lid is sufficient to drop it down partly upon the ball, just before the moment of its contact with the lower lid, there is an involuntary contraction of the *orbicularis* which elevates the lower lid and brings it in contact with the upper. Some have supposed (*Rosenbach*) that this contraction of the *orbicularis* is maintained during sleep, just as is the contraction of the sphincter of the iris, and that the want of this contraction is the cause of the half-open eye during sleep. I think there may be another explanation. Look for a moment at this patient's mouth. I tell her to laugh (and patients almost always do laugh at the absurdity of such a request at such a time), and you will see how the angle of the mouth is drawn over to the right side. But after all risibility has passed, you see that the mouth has not returned to its natural position of repose, but that the angle of the right side remains elevated above its normal position. Is this a continuance of the muscular con-

traction? No, it is simply that the antagonist muscles of the opposite side, which normally would pull the angle back to its place, do not act. There is a contraction remainder which there is no force to overcome. If I pull the angle down to its normal position at rest, it remains there,—an important point, by the way, to remember in the treatment.

Now, this may be the case with the levator palpebræ. I cause the patient to make an effort to close the eyes, and with my finger I press down the upper lid on the paralyzed side until it touches the lower, and you see that it remains in that position, and the eye is shut. When the patient laughed, just now, you saw what a great disaccord there was between the two sides of the face. This was caused, of course, by the immobility of the paralyzed side. Now, in a paralysis of the face from a lesion of the cerebral hemisphere, as we have it in hemiplegia, you will often find that, though the patient cannot voluntarily elevate the angle of the mouth on the side paralyzed, when he laughs the movement is almost or quite as great as on the sound side. He laughs on both sides of his mouth. This means that in nerve-injury the break in the motor path is absolute, neither volitional nor emotional impulses can pass it, but in hemispherical lesion emotional impulses may find their way to the paralyzed muscles when volition cannot send its commands. I make the patient put out the tongue. It is protruded straight, but to an inexperienced or careless eye it does not look so at the first glance. This comes from the want of symmetry of the mouth, for we are accustomed to see the mouth straight, and measure any deviation of the tongue by it. It would be a grave mistake in a case like this to suppose that the tongue was thrust out to one side, for that would imply the affection of another nerve, the hypoglossal, which would indicate worse mischief than a Bell's paralysis. This one-sidedness of the mouth sometimes causes an indistinctness of articulation, which we must be careful to refer to its true cause,—namely, the imperfect formation of certain words by the half-paralyzed lips,—and not confound it with those defects of speech which so frequently accompany diseases or lesion of the brain.

While we have the tongue under observation, let us test some of its other functions besides its motility. Here I moisten the left (paralyzed) side near the tip with a drop of vinegar. There is no perception of its taste; but when I put the vinegar on the right side the patient immediately announces emphatically that it tastes sour. What is the meaning of this? It means that in this case the lesion of the seventh nerve is located in a definite part of its course. The nerve which carries the sensation of taste from the tongue to the brain

is the chorda tympani, which leaves the seventh while that nerve is in the bony canal of the temporal bone. The fibres of taste of the chorda belong to the fifth pair, and, if we trace them upward, we find that they leave the trunk of the facial through the great petrosal nerve to join the sphenopalatine ganglion and through that to pass into the second branch of the fifth nerve. If, in a case of paralysis, taste is not affected, we know that the lesion is situated below the exit of the chorda fibres from or above their entrance in the trunk of the facial. If the lesion is below their exit, it is quite near or external to the stylo-mastoid foramen, and the case is likely to be a tractable one. If the lesion is above their entrance into the nerve the case is grave, as the trouble is so near the central nervous organs.

Can we distinguish which of two such cases is before us? I think we can. Our patient complains of some trouble in hearing, which she describes in a very confused and indefinite way; but in some cases where the intelligence of the patient is sufficient to enable him to note and recount his symptoms accurately, he describes a condition of hearing in which there is an abnormal acuteness of perception for certain sounds (hyperacusis), or it may be a constant subjective sound,—a buzzing, singing, or humming. To explain this we must remember that from the facial nerve, between the points of entrance and exit of the chorda fibres, is given off a branch which supplies the stapedius muscle, which muscle assists in adjusting the apparatus of hearing for the due reception of sounds. Now, if the lesion of the facial nerve is above the point where the chorda fibres join it, taste will not be impaired, but the stapedius muscle will be paralyzed, and hearing will probably be interfered with. If both taste and hearing are affected, the lesion is about the middle of the aqueduct of Fallopius, above the nerve for the stapedius. If, lastly, neither taste nor hearing is affected, the lesion causing the facial paralysis is near or external to the stylo-mastoid foramen.

There are other symptoms which may be made use of to discriminate the locality of the lesion, as for instance alteration of buccal secretion and paralysis of the palate, but they are less marked and constant, and we have not time to discuss them. But you must carefully remember that disturbances of hearing often accompany facial paralysis, because of disease of the middle ear. Indeed, disease of the middle ear often is the origin of facial paralysis. And then, again, a lesion may affect both divisions of the seventh pair, giving the mixed symptoms of facial paralysis with vertigo and auditory trouble from implication of the acoustic nerve.

Our patient complains of pain about the ear, the region around the external auditory meatus. This is a not uncommon symptom, and must be referred to sensitive fibres in the distribution of the facial nerve derived from its connection with the fifth pair and the vagus.

I must take another opportunity to discuss with you the electrical reactions of the paralyzed muscles, and the treatment of facial paralysis.

LECTURE II.

GENTLEMEN,—I again bring before you the patient with facial paralysis whom you saw at the last lecture. Having gone over with you most of the prominent symptoms resulting from the lesion of the seventh pair of nerves, I will to-day consider some very important changes that have taken place in the condition of the paralyzed muscles.

I suppose all or most of you have seen or felt the application of the faradic or interrupted current of electricity (the humming, buzzing machine) to the surface of the body, and you have observed how the muscles contract under its influence, as, indeed, it is one of our most powerful muscle stimulants. You will see that with the strength of current I here apply to the unparalyzed side of the face the most grotesque grimaces are caused by the contraction of the facial muscles. When I apply the electrodes to the paralyzed side, no muscular contraction disturbs the blank tranquillity of expression, and even when I increase the strength of the current until it causes as much pain as the patient can bear,—and remember there is no paralysis of sensation,—there is no contraction of the muscles.

Is this loss of faradic contractility a necessary accompaniment of paralysis of muscles? No. I can show you cases in which muscles have been paralyzed for years, and these muscles still reply by contraction to the faradic current. Moreover, if I had tested these very muscles when they were first paralyzed or for several days after, they would have replied to the faradic current. This condition, then, of loss of faradic contractility has gradually been induced.

Now, I wish particularly to fix your attention on the fact that muscles which have been paralyzed from lesion in the brain do not lose their faradic contractility. Here I show you a man who has had his left arm and hand paralyzed from an injury to the brain occurring a year ago. You see that the muscles still respond vigorously to the faradic current.

But this is not all that we learn by the application of electricity.

Here is a battery which gives not an interrupted, but a continuous, current,—a galvanic or constant-current battery. Now, you must know that the two poles of this current to which these sponges are attached, and which are called positive and negative, or anode and cathode, have very different effects upon the nerves and muscles to which they are applied. The negative pole (cathode) excites nerves and muscles much more than the positive pole (anode), and in a different manner. Let us observe the effect of the poles upon, we will say, the extensor muscles of the forearm. If I place the anode sponge on some spot at a distance from the forearm (it is a matter of indifference where) and touch the skin over the extensors with the cathode sponge, at the moment of contact—*i.e.*, at the moment of closing the current—you see that the extensors contract with a short, sharp jerk, immediately followed by relaxation, the muscles remaining quiet although the current is passing continuously through them. I remove the cathode, —*i.e.*, break the circuit,—and still the muscles are unmoved. Now I place the cathode on an indifferent spot and touch the extensors with the anode. There is no contraction of the muscles, although the circuit is closed and the galvanic current passing through them. But when I raise the anode, and thus break the circuit, the muscles contract. This, then, is the law of galvanic traction for healthy muscles: cathode-closing circuit upon nerve and muscle causes contraction; anode-opening circuit upon nerve and muscle causes contraction. This may be shortly expressed by letters, C.C.C. and A.O.C. We get additional and varied phenomena of contraction by strengthening the current, but what I have just shown you is sufficient for our present purpose.

Now let me go back to our paralyzed muscles and apply the galvanic current to them. I will begin with a very weak current, which I first try upon the unparalyzed muscles. You see the current is too weak to make them contract. Now I try this weak current on the paralyzed muscles, and, contrary to what you might have expected, they contract. Now, keep this fact in mind,—namely, that the paralyzed muscles that could not be made to contract by the faradic current will contract when the galvanic current is applied not only, but that they are made to contract by a current too weak to move the healthy muscles of the opposite side,—they are more sensitive to the galvanic current than healthy muscles, there is a quantitative change in contraction.

But observe with care the manner of contraction of these paralyzed muscles. Instead of the short, sharp contraction followed immedi-

ately by relaxation, which you have seen in healthy muscles, you see a slow, lazy, I might say peristaltic contraction, which slowly relaxes. Now, mark this well. It is called the reaction of degeneration, or degenerative reaction, because it signifies a process of degeneration in nerve and muscles. This degeneration of nerves and muscles and this degenerative contraction never follow upon a cerebral paralysis, nor is it found in paralysis from a transverse myelitis, which simply cuts off the influence of the will from the muscles. To produce it the lesion must be either in the nerve-trunks or in those large nerve-cells in the anterior horns of the gray matter of the spinal cord, or those of the nuclei of the medulla oblongata, to which each motor nerve-fibre is immediately joined, and the influence of which cells is necessary for the nutrition of the nerves and muscles, so that when it is cut off nerve and muscle degenerate.

Observe in these muscles another deviation from the healthy law of contraction. Instead of the application of the negative pole (C.C.C.) causing the most active contraction, we find the application of the positive pole (A.C.C.) just as effective. Indeed, we often see a greater effect from the anode than from the cathode, though I confess I do not meet with it as often as one would expect from the books. Thus we have a reversal of the normal laws of the electrical contraction of muscles,—qualitative change.

You will readily understand how useful these facts are for coming to a decision as to whether a paralysis is of central or peripheral origin, and you can easily imagine what important results (as in a medico-legal question of damages for injuries received) may flow from such a decision.

Do not suppose for a moment that I have told you all of the facts of degenerative reaction. Time would be wanting, and I fear that I should only dilute the impression of the results you have witnessed.

One more point, however, I must bring to your attention, as showing the peculiar changes the muscles undergo in paralysis from nerve-lesion. Long after the paralysis has disappeared, and the patient has recovered voluntary control of the muscles, they may sometimes refuse to contract to the direct application of the faradic current, their faradic contractility remaining lost. Here is a patient who two years ago suffered with multiple neuritis of alcoholic origin. Besides other muscles, those of his legs were paralyzed so that he could not stand or move his toes in extension. Degenerative reaction was very marked. You see that the muscles of the leg are now very well developed, and the patient has perfect use of them. The extensors of the toes contract

with the galvanic current, whether applied to the external popliteal nerve or to the muscles themselves. The faradic current applied to the nerve also causes the extensors of the toes to contract, but when applied to the muscles themselves as strongly as the patient can well bear, there is no contraction of these muscles. Now, it is obvious how such a fact might enable us to come to a conclusion about the nature of a paralysis that had long been recovered from. This reminds me of the condition of muscles which I have seen after violent shocks to the spine, when they rapidly lose all power of replying to either the faradic or the galvanic currents, and yet they may be made to contract by direct blows upon them. I call your attention to the fact that this patient has not yet recovered the knee-jerk. I have observed that in some cases, years after recovery from Bell's paralysis, the eye that was paralyzed winks less frequently than the other, as if its reflex movements were less easily excited.

Now, what shall we say as to this patient's recovery? There are various degrees of severity of facial paralysis, and an effort has been made to classify them into mild, medium, and severe cases. I do not think you are prepared to appreciate these divisions as yet, and I will only say that in cases where the paralyzed muscles continue to contract with the faradic current after ten days or so, we may hope for a comparatively rapid return of voluntary power. If, after two weeks, the faradic contractility is entirely lost, and degenerative reaction established, as in this case, the patient must expect to remain paralyzed for several months. If the degenerative reaction disappears, and even after the lapse of some time does not return, the prognosis as to ultimate recovery is bad. We must not forget to warn our patient that when she does get well the now paralyzed muscles may become contracted, so that the eye may look smaller and the face be drawn to that side. If this is not done, she may imagine the contraction has been caused by the treatment.

Now, what shall the treatment be? If you have to deal with a case like the one before you, where the trouble has been caused by exposure to cold, and you see it very shortly after the paralysis has occurred, I would advise you to use means directed against the neuritis which has been the cause. I would apply leeches to the mastoid process, and perhaps warm applications, with every precaution to shield the face from further vicissitudes of temperature. I use iodide of potassium empirically (if, indeed, we can say that we use one drug more empirically than another), and I think with good effect in the earlier period of this affection.

But the remedy I have the most hope from is the galvanic current. The majority of such cases as our patient's, I know, will get well if left to themselves, but I feel convinced that they will recover more rapidly with the aid of the galvanic current, and I think there are some cases where the use of the current may turn the scale in favor of recovery, which would not otherwise have taken place. I pass the current in several directions. In the first place I try to pass the current as near as possible to the seat of lesion, believing, against high authority, that we have evidence of a beneficent action of the galvanic current upon the injured portion of the nerve. Thus, I put one pole—the anode, by preference—over the auditory meatus or mastoid process of the paralyzed side, and the other on the corresponding point opposite. You must use quite a weak current, or you will cause very disagreeable giddiness in your patient. And here I would say that in using the galvanic current you must be very much guided in the strength you apply by the feeling of the patient, it being rarely, if ever, necessary to use it so strongly as to give much annoyance. The most general manner of using the current is to place the anode over the mastoid process and to sweep the cathode slowly over the face in the directions in which the branches of the facial spread out in the eye, the upper lip, the lower lip, and the chin. One application a day is enough, and the time of application may be from five to fifteen minutes.

I mention strychnine as a remedy only because so many have a fixed idea that a drug which can cause involuntary tetanic spasms must be beneficial in all cases in which from any cause the will has lost its power over the muscles. I never have derived any benefit from its use in cases of Bell's paralysis.

Lastly, I think it quite important to get your patient accustomed, after vivacious talking or laughing, to replace with the hands the muscles which have been dragged over towards the sound side, putting them in their natural position of equilibrium and repose. In very bad cases the mouth is much distorted. It is a good thing to arrange a hook (you can make an excellent one by bending down the curved end of a hair-pin) in the angle of the mouth on the side paralyzed and attach it to the ear of the same side. Sometimes when the eye has been much irritated, and the patient compelled to be in an irritating atmosphere of smoke and dust, I have pulled down the upper lid over the ball and fixed it with a strip of court-plaster, which can easily be removed and renewed. You must remember that there are cases which after all your efforts will remain more or less paralyzed.

ELECTRICITY IN NEURASTHENIA AND OTHER FUNCTIONAL NEUROSES.

**CLINICAL LECTURE DELIVERED AT THE NEW YORK POST-GRADUATE MEDICAL
SCHOOL AND HOSPITAL.**

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IN studying the physiological activities of electricity, we are irresistibly led to the conclusion that its therapeutic action must be more especially in the direction of the relief and cure of nervous diseases. Experience thoroughly confirms this conclusion, and therefore he who makes much use of electricity in medicine will of necessity carefully study the neuroses.

Much fault has been found with electricity because it fails to cure the graver forms of organic disease of the nervous system, but it may be asked whether there is any therapeutic agent that will do this. As a rule, we use electricity in this class of affections for its symptomatic effects, and, by relieving pain, paralysis, spasm, anæsthesia, and a variety of other symptoms, much good is accomplished.

Electricity is essentially a stimulant, an exciter of living tissue, and whether the excellent results that sometimes follow its use in deep-seated structural disease are due to its direct influence upon the diseased parts, or to the peripheral impressions that it registers, makes but little difference.

Limited, as a rule, therefore, as its value is in the graver forms of structural disease of the central and peripheral nervous system, it not infrequently acts with extraordinary efficiency in some of these cases, and gives rise to expectations in succeeding cases that too often remain unfulfilled. Electricity, however, has wrought its best results neither in central nor peripheral nerve-lesions, but in what are commonly termed functional nerve-diseases. Because we do not understand the pathology of functional neurasthenic disease and are unable to appreciate the errors of nutrition that undoubtedly underlie all these cases, is no reason why we should not persist in the use of a remedy that

has been of such splendid service in their relief. It has been said by Erb that we might as well do away with the bromides and arsenic in functional nervous disease, because we do not understand the theory of their action, as to abandon electricity because of our ignorance of the laws which underlie its influence.

One of the most persistent as well as distressing forms of functional nervous disease is neurasthenia. It is believed by some to be wanting in distinctive features and unworthy of a place in the nomenclature of special diseases. Gowers, in his great work on nervous diseases, gives to its consideration but a few lines, and most other authors allude to it briefly, if at all.

And yet the varying and varied symptoms that so persistently group and regroup themselves in the multitudes who are so often told that they have no disease must mean something. These patients do not get well by being told that there is nothing the matter with them. The stereotyped tonic medicinal treatment, as a rule, does little good in these cases, and the effort to cure by favorably influencing the *morale* accomplishes about as little good in such conditions as it would in a case of true malaria.

In the case of this robust-looking man I present to you as interesting an example of real neurasthenia as is often met with. From his general appearance you would say that he is in the enjoyment of perfect health. His nutrition appears to be excellent, and he has indeed increased rather than decreased in weight. He looks also as if he might enjoy every moment of life, yet, on the contrary, he is, or rather has been, one of the most miserable of mortals.

For more than three years he has suffered from a variety of morbid fears that enveloped his future in gloom and seriously crippled his usefulness and interfered with his business prospects. Although many of his symptoms have disappeared, there exists even yet a general hyperæsthesia of the periphery associated with tenderness along the spine. You observe how he winces when I run my fingers down along either side of the spinous processes, and it is interesting to note that the sensitive areas are not stationary, as in many cases of spinal irritation, but shift from place to place.

The treatment by central galvanization and by general faradization, which I will now proceed to administer to the patient, is a method which has in this case, as in numberless others, proved of the utmost value. It is not a matter of indifference what manner of induction coil is used in these cases. The current from many of the ordinary induction apparatus sold through the country is entirely unfitted for

application to sensitive and irritable conditions, and often does more harm than good. The galvanic current, whatever its origin, varies little in its physiological and therapeutical effects; but the faradic current varies so widely in the impressions which it makes upon nerve and muscle, according to the length and thickness and variety of its coils, that the utmost care should be exercised in the selection of such apparatus for common use. The very best effects that are to be obtained from the use of electricity in such cases as this come from the employment of a combination of four induction coils, each succeeding coil increasing in length as it decreases in thickness. These coils must be not separate but continuous, and, as they yield a current of little quantity but great tension, any amount of resistance is readily overcome without exciting painful muscular contractions.

Now, what has this treatment accomplished for this patient? When he first presented himself for treatment, some six weeks ago, his feeling of hopelessness was extreme, almost to the point of self-destruction. He had been a stranger to restful sleep for many months, and complained especially of shooting neuralgic pains not only in the limbs, but through all parts of the body. One of the most marked symptoms that first attracted attention in this case was the sudden tremor that became manifest on every little occasion of excitement. When he first consulted me it was some moments before he could speak, so violent were the tremors, and when first presented to the class, even after he had decidedly improved in many respects, some of you will remember his extreme agitation.

Up to this time, under treatment by central galvanization alternated with general faradization he has improved immensely. His sleep is now without interruption, and the fits of despondency come rarely and are of no great severity. He will tell you that the neuralgic pains from which he suffered so constantly have almost entirely left him, and the obstinate tremors which so annoyed him whenever he met strangers seldom recur and only in very moderate degree. Although not entirely recovered, he has been enabled to resume the occupation he left some two years ago, and experiences no difficulty in acceptably performing the duties of his position.

One reason why neurasthenia has been so long neglected and so little understood is that in many cases the symptoms are so subtle, illusory, and difficult of analysis and classification. One who has not seen and carefully examined a large number of cases of this disease will hardly believe it possible that it can manifest itself in so many different ways. No one example of neurasthenia illustrates more

than a very small fraction of the great army of symptoms that have been observed in connection with this disease, and it is for this reason that so many have expressed doubt as to the propriety of any such formulation as neurasthenia. Various forms of head-pain, noises in the ear, atonic voice, deficient mental control, hopelessness, morbid fears, and a host of other symptoms go to make up the characteristics of its many types. These patients are also marvellously timid, and will delay for weeks and months before summoning sufficient courage to consult a physician and relate their woes.

Now, in my own experience, and I think also in the experience of every one who has given close practical attention to this matter, electricity not only greatly aids the action of other remedies, but it not infrequently cures when many other methods have failed.

While neurasthenia—a purely functional disease of the nervous system, a condition of profound impoverishment of the nervous force—is so often conquered by the judicious application of electricity, there is another set of symptoms commonly mistaken for neurasthenia for which electricity is by no means so efficient a remedy. These symptoms depend upon a lithæmic condition of the system, faults of assimilation that are so readily mistaken for neurasthenia that very radical errors of treatment result. It might be suggested that the presence of uric acid in the urine ought to be a sufficient diagnostic sign, but uric acid is sometimes found in neurasthenic patients and is not at all times found in the lithæmic.

According to my own experience, one of the most common and distinctive points of differential diagnosis between lithæmia and neurasthenia is the difference in the character of the mental phenomena. Both the lithæmic and the neurasthenic suffer from mental depression and a profound sense of misery, more marked indeed in the former than in the latter condition. While, however, the neurasthenic may suffer from the deepest melancholy and imagine himself heir to a thousand ills, he becomes the victim, as a rule, of no such irritability and unreasonable outbursts of temper as the man whose brain is actually poisoned by the imperfectly transformed products of digestion. The neurasthenic may be at times extremely irritable, but this irritability is more passive than active, and any ebullition of angry feeling is quite evanescent. His demeanor is, as a rule, quiet, and he manifests but little tendency to make those dependent upon him miserable by his words and actions. The touchy mood of the lithæmic, on the contrary, may last for days or weeks. It is due to actual toxæmia, is often, if not generally, accompanied by obstinate constipation, and

frequently may be for the time greatly relieved by the action of a cholagogue cathartic.

In neurasthenia, again, cold hands and feet are not by any means the rule, but in intestinal and liver derangements the nitrogenized waste circulating in the blood causes, by its irritation, tonic spasm of the arterioles, resulting in the cold hands and feet so bitterly complained of by the sufferers from lithæmia. The condition of the tongue is an important diagnostic sign. In lithæmia it is coated far more frequently and to a greater extent than in neurasthenia, although in some cases of lithæmia the tongue is but slightly affected. It may appear at first sight perfectly normal, and it is only when looked at carefully from the side that an unnatural brownish color is observed. It is in such cases as this that mistakes in diagnosis are frequently made. As regards the pulse it may be said that in lithæmia it is slow rather than fast, and in neurasthenia it is fast rather than slow. In neurasthenia the oxalates are frequently found in the urine in abundance, while in lithæmia the oxalates are not usual.

These cases of lithæmia when mistaken for neurasthenia, as is not infrequently the case, yield most unsatisfactory results, and their points of differential diagnosis cannot be too carefully studied. The neurasthenic patient, on the contrary, will almost invariably receive benefit, more or less pronounced, by methods of electrical treatment rightly adapted to his condition. General faradization, central galvanization, and static electricity have all been found to be serviceable, but in different degree and under different conditions. There is certainly no absolute standard of differentiation in the use of the various forms of electricity, but in those cases where morbid fears predominate central galvanization or simple galvanization of the brain is especially indicated. With these symptoms we have mostly cerebrasthenia, or brain-exhaustion, and under the influence of this exhausted condition the emotional nature overcomes reason and will. The results of galvanization of the brain do not perhaps show immediately, but little by little beneficial effects are observed, leading up in many instances to complete recovery.

In neuralgia electricity is one of the most efficient remedies that we possess, notwithstanding the frequency with which in certain cases it fails to bring relief.

One reason why electricity so frequently fails to relieve in the hands of some, while it proves effectual in the hands of others, is a deficiency in the power to differentiate between the two forms of electricity. In one case the faradic current may be indicated, in another the galvanic. Cases not infrequently occur where one current accomplishes good and

the other only evil. This is because they so thoroughly differ in their action on living tissue. When, therefore, a case of pain of a neuralgic type presents itself for treatment, the question is not only whether electricity should be used, but what kind of electricity, and what method of application.

I am able to show you to-day two cases which demonstrate in a very striking manner the importance of this statement. The man before you came here last week to be treated for a neuralgia of the scalp, from which he has suffered, he tells me, with little if any relief, for over four weeks. Evidently, however, we have not to deal with a case of true neuralgia, for the pain is pretty generally diffused over the head and is by no means confined to any nerve. An instructive and interesting feature of the case is that very firm pressure to the head affords, so long as the pressure is continued, marked amelioration of pain. This fact indicated to me that if electricity was to do good it must be through the use of the faradic current.

When the faradic current was applied, last week, it was found that the parts were most remarkably insensitive to the influence of this current. An amount sufficient to cause intense distress in a well person was in this case hardly felt. The relief afforded by the application, however, was very great, much greater than when pressure alone is tried, and he tells us that the pain has been far less ever since. In again applying the current, I find that a strength equal to that applied last week when the intensity of the pain was greatest, and which was then hardly appreciated, is now painfully felt, although the patient even yet can endure without discomfort a far greater amount than you or I could possibly bear. I have treated by electricity a large number of just such cases, and confidently predict that *pari passu* with the disappearance of pain the parts will become more and more sensitive to the influence of the electric current until the normal standard is again reached.

The second case to which I call your attention illustrates a type of true neuralgia, and the pain is located in the fifth pair of nerves. The cheek is not swollen, but is quite sensitive to pressure, which decidedly aggravates the pain. So accurately does the pain follow the course of the nerve that the patient can himself very readily map out the different branches.

Now, I do not positively know that electricity will relieve this patient, but believe it will. Of this one thing, however, I am sure: if benefit is to be derived from the use of this agent, it must be through the galvanic, and not through the faradic, current. What may be termed hysterical neuralgia, and the so-called *pseudo-neural-*

gias, which are simply forms of pain occupying certain areas and running seemingly in the direction of certain nerves, invariably indicate the use of the faradic current, but true neuralgia is most successfully treated by galvanization.

The effect of pressure is a very efficient aid in differentiating between the two currents in the various forms of neuralgia. I do not by any means lay it down as an invariable law, but it will certainly be found that, in the great majority of cases of neuralgia, where firm pressure over the affected parts increases the pain the galvanic current is indicated, while the faradic has the greater power to relieve when such pressure does not cause an increase of pain. In the class of cases sometimes called hysterical hyperæsthesia, it is well known that firm and prolonged pressure affords marked relief, while pressure superficially or lightly applied increases the pain. The faradic current is here infinitely superior to the galvanic. In some of these cases of excessive pain associated with anæsthesia, like one of these cases before us, strong currents with coarse vibration seem to relieve even more than the finer currents that are generally to be preferred. The revulsive method of treatment by the faradic current consists in faradizing the skin. This is accomplished by applying either the solid metallic electrode or the metallic brush.

The good results that have been known to follow this harsh and painful method of treatment are thus explained: electrization of the sensitive nerves determines a more active flow of blood; and, as neuralgias are usually accompanied by modification in the capillary circulation, it follows that the augmentation and acceleration of the flow of blood may lead to the removal of the painful symptoms. It should not be forgotten that many neuralgias are developed along with diseases that are constitutional. Neurasthenic and hysterical patients and those suffering from other constitutional anomalies are frequently the victims of severe local neuralgias. In these cases it is useless to rely upon any form of local treatment, and general faradization and central galvanization often act admirably in relieving local pains.

In neuralgia, as much perhaps as any symptom of disease with which we have to deal, the electrical treatment should at first be tentative. In the beginning mild currents only should be attempted. If the faradic current be used, and the part affected be any portion of the scalp, forehead, face, or neck, the use of the hand as an electrode is far more agreeable to the patient and is attended with better results than any form of artificial electrode. In those forms of neuralgia symptomatic in character, those that are associated with diseases of the brain

and spinal cord, or severe peripheral nerve-lesions, and especially in that form of facial neuralgia known as *tic douloureux*, electricity is of doubtful value, or at least only palliative in its effects.

The next case is one of writer's cramp. It belongs to the class of functional neuroses sometimes termed professional hyperkinesis, and has always presented on its therapeutical side a difficult problem. Of all these neuroses, writer's cramp is perhaps the most common, although analogous conditions relating to other occupations—telegraphy, piano-playing, type-writing, sewing, etc.—are frequently met with. They all present the common feature that in certain complicated and delicate manipulations disturbances of movement occur which interfere with the manipulation in question or render it entirely impossible.

Electrical treatment in these cases, while yielding results by no means entirely satisfactory, is far from being useless. It certainly more frequently does good than any other method of treatment. Electrical examination, as you observe, indicates no special change in the muscular reactions, but nerve-exhaustion is manifestly present, though whether mainly located in the peripheral part, in the spinal cord, basal ganglia, or cortex of the brain, we have no means of knowing. In these cases are sometimes observed localized atrophy, neuritis, or anæsthesia, and these symptoms should receive local treatment, the faradic current being used for the first and last symptom and the galvanic for the neuritis. To obtain, however, the best results that electricity is capable of giving in these cases, the galvanic current must be applied to the brain, the spinal cord, and the sympathetic. The method of central galvanization, if carried out in all its fulness of detail, will answer all practical purposes.

Ordinarily, perhaps, asthma cannot be classed as a purely nervous affection, but there are, I am persuaded, many cases which are of neurotic origin and which indicate this origin by the readiness with which the symptoms are allayed by electrical treatment. Taking the cases of asthma as they successively come under our observation, the major part undoubtedly fail to receive any marked and permanent benefit by galvanic or faradic treatment, and for this reason it has been asserted that no good comes from such methods. My experience has been far from sustaining this opinion, for in a certain proportion of any given number of cases I have always found more or less benefit accrue, more especially from applications of the galvanic current. The difficulty in most cases is in the use of too weak a current.

It should always be remembered that the most efficient action of electricity is at the point of the recomposition of the current,—i.e.,

immediately underneath the electrodes; that the threads of current diverge widely and abruptly, and in order to submit the deeper-seated tissues to catalytic influences of any force, the external applications must be proportionately strong. Many who have used electricity for years are surprised when told that currents of forty milliamperes have been sometimes used to the head, and even sixty and seventy in application to the neck. Everything depends upon the size and adaptation of the electrodes, and when they are of the right kind and properly adjusted, and the current is increased gradually and without interruption, the difficulty of applying a sufficient strength quickly resolves itself.

While my experience teaches me that strong currents are, as a rule, indicated in asthmatic cases, and that we shall generally fail to distinguish between the relievable and unrelievable forms if the treatment be not vigorously attempted, cases are occasionally met with which yield fair results under milder application. Here is a private patient of mine, a boy aged thirteen, who had for a long time suffered from attacks of what I believe to be purely nervous asthma. He has taken much medicine and has had the advantage of change of climate, but no satisfactory impression was made upon the disease until he submitted to electrical treatment. For two months he has received treatment almost daily, general faradization alternately with localized applications of the galvanic current. In treating him by the galvanic current I use electrodes of sculptors' clay, applying usually the anode along the inner border of the sterno-cleido-mastoid muscle, and the cathode on the extreme upper portion of the spine, with a strength of only about ten milliamperes. The attacks now annoy him very seldom, are exceedingly mild, and pass away almost immediately, but in the beginning, when they were more violent, copious expectoration of a substance much resembling boiled rice or starch took place towards the close of each attack. The interesting observation in connection with the application of electricity was that the treatment, when given at the beginning of an attack, invariably cut it short and hastened the inevitable mucous discharge.

Even the faradic current affords relief at times. On the theory that asthma is associated with nerve-irritation in the upper part of the respiratory tract, both Schaeffer and Bresgen (quoted by Erb) claim to have relieved many cases through the faradic current, applying the electrodes on either side just below the angle of the lower jaw.

PARESIS, OR GENERAL PARALYSIS OF THE INSANE.

LECTURE DELIVERED AT THE HOSPITAL FOR THE INSANE, HALIFAX, NOVA SCOTIA.

BY GEORGE L. SINCLAIR, M.D.,

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WE in this country usually speak of this most interesting form of insanity as *Paresis*. Writers in England and Scotland are more apt to call the disease *General Paralysis of the Insane* or *Progressive Paralysis of the Insane*, each name being descriptive of two of the characteristic features of the malady. To those of us engaged especially in the care of the mentally afflicted, it is a variety of disease which commands our close attention. It cannot fail to do this, for its victims are usually men in their physical and intellectual prime; its course is very characteristic, and its termination, so far as I know, is, sooner or later, death. And yet, from my own personal observation, I should say that no disease, considering its frequency, is less recognized by those who have not made insanity a special study. This may at first seem difficult of explanation, but we must remember that it is only since 1826 that it has been given its place as a distinct pathological state. In that year Calmeil published his "Mémoire." Haslam, according to Bucknill and Tuke, first described the disease in 1809, but he did not name it. Bayle referred to it in 1822, but to Calmeil the honor of both describing and naming it is awarded. Bucknill and Tuke say "it is a disorder marked by general and progressive loss of co-ordinating power over the muscles, especially those of speech and locomotion, combined with mental enfeeblement, always tending to dementia, and frequently characterized by a sense of well-being or actual delusions of an exalted character." Clouston calls it "a disease of the cortical part of the brain, characterized by progression, by the combined presence of mental and motor symptoms, the former always including mental enfeeblement and mental facility, and often delusions of grandeur and ideas of morbid expan-

sion or self-satisfaction ; the motor deficiencies always including a peculiar defective articulation of words, and always passing through the stages of fibrillar convulsion, incoördination, paresis, and paralysis ; the diseased process spreading to the whole of the nerve-tissues of the body, *being as yet incurable, and fatal in a few years.*" We usually speak of the disease as having three stages. Clouston's division is a good one, and may be followed, viz. : first stage, fibrillar trembling and slight incoördination of speech, and of mental exaltation with delusion ; second, muscular incoördination and mental enfeeblement ; and a third stage, that of advanced paresis, no power of progression, almost inarticulate speech, and at last paralysis with mental extinction.

Symptoms.—The disease, as I said, is one of much interest to those of us engaged in the treatment of the insane, and, we think, should also be so to the general practitioner, from the fact that under his care the first act of the tragedy is enacted, although, may be, the seriousness of the symptoms early manifested is not realized by him.

Briefly, those symptoms are some alteration in the general life-habits of the patient, and this alteration in the vast majority of cases is evidenced by some act or acts of extravagance, immorality, or obscenity. The parsimonious man shows a tendency to become a spendthrift, the Joseph an inclination to become a Lothario, the modest and retiring man assaults females or exposes his person in public, or in a way and under circumstances which must lead to detection. Then there is sleeplessness, irritability towards wife and children, loss of memory, leading to broken engagements in social and business matters, and delusions of the grandiose type. The patient boasts of his wealth, his physical and intellectual powers, his eminent supremacy in all things. He is unmanageable at home, and is often arrested for some act in opposition to the public safety, or his medical man recognizes his mental change and commits him to a hospital.

When admitted here we usually find, in addition to a condition of effusive cordiality and unnecessary hilarity, much restlessness by day, sleeplessness at night, and delusions ; we can usually also detect in the pupils inequality or irregularity or both conditions, and some evidence of muscular incoördination, rendering it not altogether easy for the patient to speak fluently or to pronounce certain words, like *infallibility, constitutionality, unparalleled*. Then come the maniacal symptoms, during which the patient is very violent, noisy, dirty, and destructive. Later these lessen, and the victim may have an epileptoid seizure. Then gradually comes on a condition of dementia, with entire prostration of mind and body. Finally he is reduced to a piti-

able condition of almost absolute helplessness, becomes bed-ridden, has bed-sores, and dies of exhaustion, after lingering for months; or a diarrhoea occurs, or epileptiform convulsions set in and hasten the desirable end.

Through the whole disease the delusions are apt to continue, and there is a state of perfect happiness on the patient's part in painful contrast with the actual condition of things. It is a curious dispensation of Providence which gives to the victim of an incurable mental malady a feeling of the most complete satisfaction and happiness. I would also merely mention that, in addition to the exalted character of the patient's delusions, they are remarkable for their changeableness and utter absurdity. A man is half a dozen celebrities at the same time, and can be easily diverted from one line of insane ideas by suggesting another equally improbable and impossible.

The following case illustrates some of the symptoms of the disease:

CASE I.—L. M., a German by birth, forty years of age, married eight years, has lived in this country nine years, and supported himself by teaching music and languages. At one time he was a hard drinker, though not so since his marriage, but has worked very hard, and has strong sexual propensities. About three weeks ago his wife noticed a change in his manner. He was always irritable, but became worse; complained of headache, was depressed in spirits, and could not sleep. Then he stopped work, said he was rich, and did not require to toil longer. He spent all the savings of years in a week, and when expostulated with became furious, said he was worth millions, and would have anything and everything he wanted. He became profane, exposed his person before his wife and children, punished a child severely for a very trivial offence, neglected his engagements, gave very contradictory orders, and was furious if they were not obeyed, became absolutely sleepless, and was so noisy that no one else could sleep. He was arrested, certified as insane, and sent to us for treatment.

He arrived here late at night after a long railroad journey. He was much excited and very noisy; imagined he was a general giving orders to his army; resisted violently going to the ward, and when put to bed refused to remain, and spent the whole night shouting and calling upon his troops to come to his rescue. I saw him next day at the morning visit. He could not be persuaded to sit down; was walking about demanding his wife, abusing everybody, offering checks to any and every one for large sums of money; spoke of his eminence as a scholar, his prowess as a soldier, his strength as an athlete. In each department he was pre-eminent. He would not permit any one else to

talk. I examined him as well as I could. His pupils were contracted, which I thought might be due to a dose of morphine which he had taken the day before he came in. His facial muscles were twitching and jumping, and his broken English was at times unintelligible from the thickness of speech. His pulse was full, and beating at 120 per minute. I could not take his temperature. Later in the day he was a little more quiet. I found out that now he regarded himself as the "second son of God,"—he repudiated the idea that he had a wife. That night I gave him a strong dose of fluid extract of hyoscyamus. He took it willingly, declaring it to be Hungarian wine. Indeed, from the first his sense of taste could scarcely be said to exist; he would eat the most horrible things and appear to relish them. The next day he was still more quiet. His pupils were both irregular and unequal, and his tongue, when protruded, came out with a sudden shoot; it was tremulous. If his hand were grasped the muscles of the palm seemed to contract in an involuntary and incoördinate manner. He could walk a plank, but kept his legs far apart, and he could not turn rapidly, but had to go round in a circle. He had changed his personality. He was both a duke and a marquis, and was going to be married "tomorrow" to three beautiful princesses, and give each a million of dollars. He was going to Europe by means of electricity, and would accomplish the journey in three hours; when there, his electric Arabian steeds would take his chariot at the rate of one hundred miles a minute.

No idea seemed too extravagant. He was half a dozen people at one and the same time; he could not recognize inconsistencies or impossibilities. This hospital was a magnificent palace; we were all his slaves. At night I again gave him hyoscyamus. He slept a few hours, and was very noisy when awake. The next day was a repetition. He assaulted every one who interfered with him. He next became a wonderful musical composer, and went to bed declaring he was to write the greatest opera in the world. He was very quiet, but next morning it was found that he had defecated on the floor. With his excrement he had bedaubed the walls of the room, his bedding was torn in strips, and he was attired in the most fantastic of costumes, and was quite happy. He said he was designing the costumes and scenery for his new opera.

His appetite was large. He became quite fat, and was never still. His delusions were too numerous to mention. He repeated his "frescoing" several times. He even ate his excrement, claiming it was "celestial food." He was every great person that ever lived. His wealth was boundless. His nights and his days were one wild whirl of

excitement. He was never rational ; and, while impatient at being kept so long in one palace, was the most absolutely happy man I ever saw.

In a few months he grew more quiet. Then came epileptoid seizures, he grew thin, more ataxic, and less able to articulate. Finally his prostration became extreme ; he could only swallow fluids ; he could not retain his urine or fæces ; he rapidly emaciated, bed-sores formed, and finally he had a series of convulsions, and died of effusion.

This case illustrated very completely a symptom of paresis, viz., the changeableness of the delusions. An ordinary lunatic who considers himself a duke is content to remain that one person. He will argue, too, sometimes keenly, in support of his delusion. A paretic is half a dozen different people at the same time. He asserts a thing, but will not argue it, and frequently can be pacified in some threatened outbreak by simply changing the subject of conversation. Again, when this poor fellow was lying helpless in bed, scarcely able to lift his hand, he was always "first rate," in reply to a question as to his health. He still thought himself a giant in strength ; was still a prince, and ordered me to be shot for disagreeing with him.

CASE II.—Another case is that of Dr. M., a physician, aged forty-five years, a hard worker and drinker. He came to us in the latter part of the second stage. He was very ataxic, could scarcely walk without aid, but was full of grandiose ideas. He was worth millions, was a million feet tall, and a million years old, and weighed a million pounds. He is always happy, always "first rate." He sits for hours grinding his teeth and making a most distressing and disagreeable sound. He is restless at night, and sometimes keeps every one awake by his loud laughing. He tosses about his room, and one morning I noticed a blood tumor, *hæmatoma auris*, on his left ear. This is very apt to appear among paretics as the result of very slight violence or of no violence at all which we can trace.

This case had convulsive seizures which ultimately left him paralyzed. A few days before he died, when he was scarcely able to speak, he said he was not a man but a little boy, and was only ten years old.

I have known this change of opinion as regards one's social status to occur in three or four cases. This case lived twenty months after being admitted here.

Now my object in introducing cases has been to try and impress you with the prominent and characteristic symptoms of this disease.

Who are liable to this disease ? It is specially liable to attack men. I do not know that I ever saw a case in a female. If women are attacked they are from among the class that live riotous lives. Clouston

says that among the female cotton operatives of England it is not uncommon.

Sankey says the persons liable are : 1. Men of the lower classes. 2. Males of the upper class. 3. Females of the lower classes. 4. Females of the upper class. The cases I have seen have been all men drawn from what in England would be the middle and lower classes, with two or three exceptions.

Age is an important factor. At twenty years of age we should not look for paresis. It is rare at twenty-five years, rare also at sixty, unknown at seventy. The common age is between thirty-five years and forty-five years. The patients are generally in their greatest vigor of mind and body, and in many cases are exceptionally gifted in mind and fine specimens of physical manhood. They have usually been free from the ills to which flesh is heir.

It is apparently a disease of civilization. Savages are free from it. The negro has developed it since he became a freeman and a citizen. Clouston says it is due to excess in eating and drinking, in mental application and overstrain. He does not think syphilis, *per se*, is a cause. Upon this I cannot speak positively. I have certainly seen paresis occur in patients who have had syphilis.

Is it hereditary? Probably not. Insanity may be hereditary, but I am not aware of any facts which justify me in stating that paresis reappears in the same form in another generation.

To quote again, "The things which most excite and at the same time most exhaust the highest brain energy are those that tend most strongly to cause the disease. For example, over and promiscuous sexual indulgence, combined with hard muscular or mental labor, a stimulating diet of highly-fed flesh meats, the brain all the time excited and poisoned by alcohol and syphilis. The Durham miner, when earning good wages, fulfils the most perfect condition yet known for the production of paresis. The result is that every sixth lunatic admitted to their county asylum labors under paresis."

Diagnosis.—The best diagnostic symptom in the early stages is the change in articulation. It is not stammering nor hesitation; it more closely resembles the thick speech of a drunken man. The lips at the same time are tremulous, as is the tongue, which is protruded in a jerky manner. The pupils are, even in an early stage, unequal or irregular or both. The delusions are grandiose and peculiarly changeable. The patients are in the vast majority of cases men, and their age is between thirty years and fifty years. They have probably been free livers, have enjoyed life, and indulged in both its work and its pleasures to excess.

Remember, though, that excess is a word which has different meaning in different people. Excess in one may be moderation in another, or *vice versa*.

Later in the disease you have the epileptoid seizures, the gradual but steady increase of the signs of muscular incoördination, with the persistence in the individual of his grandiose delusions. Finally, the condition of absolute helplessness, when the patient loses all evidence of mind, is unable to articulate, unable to sit or stand, but lies like a log, helpless in bed, is found in few other diseases.

Prognosis.—All authorities agree that this is most unfavorable. I have never seen a recovery. It admits of remissions which promise recovery, but it is by all odds the most unfavorable form of insanity as regards mental restoration, and the most fatal.

Remissions may last for weeks, months, even years, but the man is not the same person, and he only keeps up an appearance of being well by living the simplest of lives, and by not calling into exercise any of the highest mental powers.

It sometimes happens that patients do not pass at once from the first maniacal stage into the second, but, instead, the acute symptoms subside, the delusions are denied, or at least not asserted, and something like a return to the normal condition of health occurs. We have several times sent away such patients to the care of friends. In two cases only were they able to remain longer than a few months. When going they and their friends were both cautioned and warned of the liability to relapse. So long as no mental work was attempted there was no trouble; the moment the man began to think, he relapsed.

I am a firm believer in the effect of excessive sexual indulgence as a producing agent in this disease. When your patient is married, you should not only caution *him*, but you should also warn the wife that extreme moderation is absolutely necessary. The pleasures of the marriage-bed are what Dr. Savage calls "fatal joys" to the paretic. It is a delicate and difficult subject to allude to in speaking to a wife. She may think you wish to insinuate that her husband has not been true to her. You may be obliged to explain that you do not mean that he "poaches upon other manors," but that he sports too mercilessly and exhaustively upon his own.

How long does the disease last? From a few months to years. I think the average duration here would be about eighteen months. We have now two cases, one of which has lasted three, and the other eight years. Dr. Clouston speaks of a case living under his care for twenty-two years.

Pathological Anatomy.—Westphal's investigations would go to show that in some cases, at any rate, marked changes can be discovered in the structure of the spinal cord. He distinguishes two forms of paresis, the *tabetic* and *paralytic*. The former he attributes to gray degeneration of the posterior columns of the cord. In such patients the motor disturbance precedes the mental for some time.

He describes three varieties of diseased condition in the tabetic form :

1. Affection of the posterior columns throughout their whole length, consisting of atrophy of nerve-tissue and a growth of connective tissue which sometimes takes the place of the nerve-tubes.

2. An affection of the posterior section of the lateral columns throughout their whole extent.

3. A mixed form of affection of the posterior columns, and of the posterior portion of the lateral columns.

In these last two he regards the disease as a chronic myelitis. Henry Bonnet, in 1868, found pigmentary deposit in the cervical ganglia of the sympathetic, and was disposed to attach much importance to it. Later observation shows that this pigmentary change is not found in paresis only, but is common in all forms of chronic mental disease.

In the paralytic form the mental symptoms precede the motor, and here the anatomical changes are seen, especially in the brain. I give a *résumé* of Clouston's account. The bones of the calvarium are hardened and thickened. The dura mater is adherent to the bones. Between it and the arachnoid there is a new substance of a peculiar kind. It is not an inflammatory product ; it is called a false membrane. It varies in consistency from fibrous to a fibreless jelly, in color from grayish-white to red, and in thickness from a film to a quarter of an inch, in extent from a patch or two to a covering for both hemispheres above and below. It contains new blood-vessels and nearly always blood-corpuscles or blood-coloring matter.

The microscope shows it to be a newly-organized fibrous tissue, and it is the result of intense morbid action in the convolutions and changes in the blood-pressure within the cranium. The arachnoid beneath this is thickened, mottled, and striated. Beneath this is a material which looks like a dull jelly. If it be punctured, a dirty, opaque fluid, varying in quantity from four ounces to six ounces, escapes. It is probably compensatory, and takes the place of the atrophied convolutions. The pia mater is thickened and toughened, and, when removed, is so firmly adherent to the convolutions that portions of thin gray matter come with it, leaving an eroded surface behind. The adhesion of the pia mater is always an indication of mental disease. The extent of attach-

ment varies from a small part of the anterior lobe to the whole brain surface. The hemispheres adhere anteriorly. This softening is a necrosis of the mind-tissue.

The ventricles are enlarged, and their lining membrane is enormously thickened, and looks opaque. It has undergone hypertrophy. There is no single tissue in the brain whose condition is so morbid as this epithelial lining of the ventricles.

On section, the gray matter of the brain is found to be divided into two distinct layers, the outer gray, with a line of red congestion separating it from the inner. Along this line the brain seems softer. There is no real sclerosis, though the gray matter may be slightly harder in texture than the other. The gray matter is thinner, and the white is irregularly congested. The perivascular spaces are enlarged and the small vessels have tougher coats. The microscope shows great proliferation of the nuclei of the neuroglia.

The structure of the outer layer of convolutions is changed, and a dense, unorganized-looking tissue takes the place of the beautiful and regular layer of cells and fine granules of the healthy condition.

The larger cells are degenerated and atrophied in patches. The blood-vessels are diseased, their coats being thickened and full of nuclei. Sometimes they are obliterated. The perivascular canals are enlarged, sacculated, and filled with *débris*, which obstructs them and prevents their transporting effete material.

In advanced cases all the nervous tissue of the body is diseased and degenerated, including the retina, the peripheral nerves, and the sympathetic ganglia.

Changes occur in the structure and composition of the osseous system which render fracture a not uncommon occurrence as the result of a small amount of violence.

Treatment.—It will be well to consider, first, the general prophylactic treatment of insanity, of which paresis is only a subdivision, then the management of the incubatory stage of paresis, and, lastly, the hygienic and therapeutic remedies which can be employed when the disease has obtained full control.

Undoubtedly, the prevention of mental disease is a subject of the greatest importance, and is of interest to every one of the community.

I think we, as physicians, could exercise some influence, more than we do, perhaps, if we would educate the public regarding the dangers of intermarriage among those possessed of the neuropathic diathesis. Nothing is more certain than the transmission of the unstable nervous organization. Even though paresis as such may not be inherited, a

condition of system predisposing to its appearance can be transmitted through parents, so that when, as medical men, our opinion is solicited as to the wisdom of certain young people marrying, we should give no rash answer, but should study the family history as well as the individual characteristics of the persons interested, and only then advise or discountenance the joining of two such in holy matrimony. Paretics are permitted to return to their wives during periods of remission. They can and do beget children while they are themselves mentally afflicted, and the result is offspring who early in life give evidence of some neurosis, or who are born deformed physically, or who labor under both mental and physical disease. In my experience it has seemed to me that those high-strung, nervous individuals, unfortunately for themselves, unfortunately for generations yet unborn, are strongly attracted to each other. Their very similarity of taste, itself the result of diathesis, will early convince *them* that they are specially and peculiarly made for each other, and, as a consequence, they marry, beget children who are cursed with that worst of all tyrannies, the tyranny of a bad organization. We, as physicians, should discountenance such unions. We should do more, viz., endeavor to educate public opinion so that it may be regarded as a grave social error for such persons to marry. It is a difficult task, I know, but one which we, as the persons best informed as regards the transmission of disease, should not hesitate to undertake.

Then, again, if our opinion is asked as to the proper mode of educating children in whom is a strain of nervous instability, we should be prepared with an answer.

I am fully aware of the unusual intellectual power sometimes exhibited by such children. For this very reason, because the fire of genius can consume its possessor, we should counsel rather holding in check than giving full swing to their precocious talents. They should have a good education, by which I mean that both the moral and intellectual parts should be trained so as to render the psychical powers strong, well-balanced, and harmonious in action, adapted to resist hostile influences, and to promote that self-restraint and self-contained reaction upon the social, religious, and intellectual environment which conserve the mental energy and fitly direct the dynamic powers of the whole being.

The above implies the avoidance of all excesses, of overstrained and extreme emotion, of excessive intellectual labor. It is easy to prescribe all this, it is more than difficult to live up to it and to induce others to do so.

Prevention of a Threatened Attack.—A patient threatened with paresis, who has shown symptoms of the prodromic period of mental alteration not as yet amounting to decided mental alienation, should be at once freed, so far as possible, from the circumstances or causes under which the symptoms have arisen. He should be ordered to lead a perfectly regular life, keep early hours, take moderate exercise, give up alcohol in any and every form, discontinue sexual indulgence, use bathing, friction to the skin, cold to the head if it is heated, to keep the feet warm, and attend to the action of the bowels and kidneys. Every source of mental worry should be avoided at any cost, no intellectual labor be indulged in, and only such reading and conversation as will not fatigue should be allowed. Bright, cheerful society of his family and congenial friends should be allowed and cultivated. His mode of life should be changed, and he should seek in repose a renewal of his nervous tone and a power of resistance to hostile influences.

All things considered, these various indications can be best carried out by leaving a city and going into the country, although travelling about from place to place is not to be recommended.

Should success result from such treatment the patient may be allowed to return to his ordinary occupation, if it be not too full of anxiety and worry; otherwise he had better change it.

When the disease is fully established, nursing is the principal mode of treatment. All things considered, this can best be done, in the majority of cases, in a properly-equipped and managed hospital. Keeping them at home when they cannot be properly controlled, when they may commit suicide, squander their means, upset the comfort of every one, and do themselves no good, is not desirable nor to the best interests of the individual.

In their management away from home, tact and gentleness will occasionally accomplish wonders, but there are times when forced separation from their fellows is absolutely necessary.

During the early stage, characterized by great mental excitement, noise, and violence, alcohol is inadmissible. The diet should be simple, nourishing, and not in excessive quantity. The excretory organs should be kept in order, and the patient should pass as much time as possible in the open air. Daily bathing in tepid water, with cold to the head, is also in many cases attended with excellent results.

As the disease progresses and the patient shows signs of debility, the diet may be made more generous, and milk and eggs may be allowed to enter largely into its composition. Stimulants may also be used in moderation, especially towards the end of the disease. As the

patient grows more and more feeble he must reduce the amount of his exercise, and gradually cease attempting to walk. When this period arrives he should recline in an easy chair, well supported with air-cushions, and finally he must be put to bed upon an air-, water-, or wire-mattress, and his position frequently changed. To avoid bed-sores the skin should be hardened over the sacrum, buttocks, and trochanter by the use of some astringent solution, such as liquor plumbi subacetatis. Perfect cleanliness should be maintained by frequent baths, the patient being carried bodily to the tub. The catheter should be used in distention of the bladder, and some form of urinal in incontinence.

Should diarrhoea set in, it must be treated upon general principles, especially regulating the diet; and should constipation exist it should be relieved by mild aperients or enemata. The food should be given chopped fine, in small quantities, frequently repeated, and a nurse should personally see to its administration.

Drug Treatment.—This to a large extent must be the treatment of symptoms.

If a history of syphilis can be obtained the use of hydrargyri bichloridum or potassii iodidum, the latter in full doses, or the two drugs combined, is called for. My personal experience in this line has not been satisfactory. During the stage of acute mania, full doses of the bromides, either alone or combined with tincture of digitalis, in doses of twenty to thirty minims three or four times daily will sometimes give excellent results. Opium, morphine, and tincture of hyoscyamus have not yielded encouraging results in my hands; the former, especially in a few cases, seeming to do actual harm. The freshly-made fluid extract of hyoscyamus has sometimes acted powerfully as a calming agent.

Acting upon the inflammatory theory of the disease, antiphlogistic measures have been adopted. I have had no favorable cases.

Vesication, produced by emplastrum cantharidis, or tinctura iodi, has proved a failure with me.

For the sleeplessness, warm baths, with cold to the head at bedtime, will at times do good.

Hydrate of chloral, thirty grains, at bedtime, or combined with bromide of potassium, will frequently give five or six hours' rest. So will fluid extract of hyoscyamus. The chloral will continue to act well for long periods. Hyoscyamine, either by mouth or skin, I do not recommend.

Hyoscine hydrobromate, in doses of one-hundred-and-twentieth to

one-hundredth of a grain hypodermically, has with me always acted promptly and well. I rely upon it more than anything else in the most excitable cases. By the mouth I have never seen the least effect.

After the tempest has subsided, tonics, especially iron in the form of *syrupus ferri phosphatis co.*, are called for. The bowels should be kept regular by mild aperients. For the epileptoid seizures, occurring in a strong, robust man, I do not hesitate to bleed from the arm. In several cases prompt recovery from the convulsions has ensued. You can safely take twenty ounces of blood from the arm. In other cases I have used subcutaneous injection of morphine, one-fifth grain, and this, with application of cold to the head, is undoubtedly good treatment. *Physostigma* seems to be regarded as of doubtful efficacy.

When the patient becomes bed-ridden and bed-sores form, we endeavor to keep them aseptic, and sloughs are cut away as they form. The sore is dressed with dry *zinci oxidum*, and over this is laid a pad of soft, well-picked oakum, the whole secured by a bandage. This mode of treating bed-sores gives us the best results. For the blood-tumor of the ear, *hæmatoma auris*, I know of nothing better than blistering with *liquor epispasticus*, the ear being then covered with cotton-wool kept in place by a bandage to prevent further injury.

The diarrhœa which occurs towards the end of the disease may be treated by careful attention to diet, combined with astringents. Alcohol can be used to advantage, in the latter part of the disease, as a means of prolonging life. Death may occur from convulsions, diarrhœa, pulmonary complications, or general exhaustion.

Surgical Treatment.—In the *British Medical Journal* of November 16, 1889, there is a report of a case of paresis by Dr. Shaw, in which, acting upon the theory that pressure by the fluid accumulated beneath the arachnoid caused many of the symptoms, the patient was trephined, the membranes punctured, and some ounces of fluid allowed to escape. Amendment followed. Whether this operation will ever become recognized as a part of legitimate treatment, I know not. Sufficient time has not elapsed to give any positive opinion as to the correctness of the theory upon which it was performed, nor as to the permanency of the amendment which occurred in the patient's symptoms.

PERIPHERAL NERVOUS SYSTEM; GENERAL PHYSIOLOGICAL CONSIDERATIONS; NEURALGIA OF THE STUMP; PERIPHERAL PALSY OF THIRD CRANIAL NERVE; TRIGEMINAL NEURALGIA.

CLINICAL LECTURE DELIVERED AT THE HARVARD MEDICAL SCHOOL.

BY JAMES J. PUTNAM, M.D.,

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GENTLEMEN,—In my previous lectures on the peripheral nervous system I called your attention particularly to the following subjects:

I. We considered the anatomy and physiology of the *nerve-fibre*, and the nutritive conditions necessary to its life. The following are the facts which I believe to be of the greatest practical importance in this connection:

1. The nerve-fibre is an elongated ganglion-cell process. The integrity of the cell is necessary for the health of the fibre, and the destruction of the cell or the impairment of its trophic efficiency is liable to entail the death of the fibre. When a nerve-fibre is separated from the nerve-cell at any part of its course, the distal end of the fibre rapidly degenerates; on the other hand, the central end which remains in connection with the cell retains for months, and even years, an almost unlimited power of growth. It is this that makes the cases of injury of the cauda equina (fractures below the first lumbar vertebra, etc.) so hopeful, as compared with injuries of the spinal cord just above; and gives a warrant for the operation of secondary suture of divided nerves, even after the lapse of many months.

2. The tissue-change which occurs in the nerve-fibre is small, but each nerve-bundle is provided with an elaborate system of lymph-channels and with blood-vessels, indicating that the local conditions of nutrition are by no means wholly unimportant. The small amount of tissue-change in the nerve as compared with the cell is clearly indi-

cated in the spinal cord by the immense difference between the amount of blood circulating in the central gray matter and that in the fibrous material. We should not fail to note in this connection an important fact, demonstrated by Bowditch and Vedenski, that the nerve-fibre is practically inexhaustible; so that, for example, it may be faradized for hours together and yet respond as well at the end as at the beginning, as indicated by the contractions of the muscle in which it terminates, provided that the muscle itself, which is very readily exhausted, has been protected by curare from fatigue. Both these facts are of considerable pathological importance.

3. The peripheral—that is, the distal—end of the nerve-fibre is exposed to certain morbid influences from which the remainder of the fibre is mainly exempt. This is due to two causes,—first, that the distal end is the farthest removed from the trophic centre of the nerve; second, because it terminates in certain tissues (muscles, skin, joints, etc.) which are liable to communicate to it their diseases. The much greater blood-supply of the terminal end may also play an important part. Its relative vulnerability makes this part of the nerve especially liable to suffer both from general impairment of nutrition (anæmia) and also from toxic conditions of the blood, such as give rise to multiple neuritis in its many forms. Not only is the vulnerability of the distal end of every fibre probably greater than that of the parts nearer to the cell, but the different nerves of the body seem to differ in their vulnerability. Thus, in general, the nerves of the extensor muscles are more prone to disease than the nerves of flexor muscles.

4. When a nerve-fibre becomes diseased, its degeneration may eventually entail that of the ganglion-cell of the spinal cord from which it springs, or even of the spinal tracts (as in amputation and in some forms of neuritis). Clinically speaking, however, the upward degeneration of nerves, which is so common and important, takes place far more often through the medium of the connective tissue along which the inflammation travels. In this way inflammations starting in a peripheral nerve may spread to the whole plexus, the membranes of the spinal cord, and so on.

5. The axis-cylinder, which is the essential part of a nerve-fibre, is, in the case of the motor and sensory nerves, surrounded by a coat of myelin, a fatty substance enclosed in cells which are, as it were, wrapped around the fibre. This serves for insulation, and is not much developed except on nerves supplying rapidly-acting muscles or carrying differentiated sensory impulses.

II. I next spoke of *nerve-bundles*. These contain fibres of dif-

ferent functions, or, rather, fibres with different central and peripheral terminations.

1. It is a fact of remarkable practical interest that these different sorts of nerve-fibres—or, rather, the functions which they subserve—are not equally disordered by lesions affecting the whole nerve. Thus, the motor functions usually suffer most severely, the sensory next, the vaso-motor, secretory, and trophic next.

2. It is also noticeable that the character of the symptoms varies with the character of the lesion; thus, while the trophic and secretory disorders are but slight in cases of partial compression of the nerve, they may be very prominent when the nerve is irritated, as by inflammation.

3. The nerve-bundle also contains a large amount of connective tissue in the form of septa between the nerve-bundles and fibres. In this connective tissue lie the blood-vessels and lymph-spaces. The connective-tissue elements take on an active growth when the nerve elements are destroyed, just as weeds spring up in a neglected pasture, and this overgrowth of connective tissue may be so great as to form a material impediment to a regeneration of an injured nerve.

III. I will, in the third place, call your attention very briefly to the arrangement of the nerves in the *nerve-roots* which go to form the primary *nerve-plexuses*; but I shall not dwell on this subject further than to say that the groups of muscles and cutaneous areas represented in the nerve-roots are quite different from those represented in the nerve-trunks below the plexus, and that they correspond more nearly to the arrangement of the sensory and ganglion cells of the spinal cord. A knowledge of these facts is a material aid in the localization of lesions. These points will be referred to again later.

I have already shown you a number of cases in illustration of these principles, as well as of the methods of electrical diagnosis.

Here is another case that has a twofold interest. It is one of *nerve injury, amputation, neuroma, ascending neuritis, reamputation without relief*, and, finally, *hysteroid symptoms* due to the pain and irritation, such as Dr. Weir Mitchell used to see among the victims of gunshot injury in the late war. Six years ago this patient's hand was caught in a threshing-machine and the fingers were badly torn. The hand was amputated. A neuritis was set up which spread until it involved the whole brachial plexus. Two large fibroid bulbs were discovered near the ends of the nerves, and were excised; but the pain continued. Exquisitely tender spots developed on the stump, and the muscles around it twitched constantly. A second amputation was done about

six months ago by Dr. M. H. Richardson, but the symptoms persisted unchanged. The patient is a terrible sufferer, and refers his pain to the absent hand and fingers, as so often happens.

When I first saw him, last spring, I discovered a symptom which it is important for you to be familiar with, and which is still present. This is a hemi-anæsthesia, a moderate but well-marked impairment of cutaneous sensibility of the entire affected side, including the head, trunk, and leg, and causing a retraction of the field of vision of the eye. This symptom is one that you may see after many sorts of nervous shocks, and it has gained a well-deserved medico-legal reputation in connection with railway injuries. Oppenheim has recently called attention to the frequency with which hysteroid symptoms, of which this is one, show themselves in connection with organic disease, as Dr. Seguin, of New York, and others have frequently shown. It will be important for you to bear in mind, for the sake of interpreting such groups of symptoms correctly, not to attribute everything that occurs in connection with organic diseases to gross lesions, nor to attribute everything to hysteria if certain so-called functional disturbances happen to be present.

As regards the prognosis and treatment of cases of this class, it often happens that one goes on amputating without result, simply because the neuritis has crept up further than we can reach in this way. One surgical procedure has been tried several times by Dr. Abbe, of New York, which, I think, is quite justifiable, in spite of its apparent seriousness, and which offers a new hope of relief. This consists in opening the spinal canal and dura mater and dividing the posterior nerve-roots corresponding to the affected limb. So far as the danger to life in the operation is concerned, it is not great, but we are not yet in a position to promise the patient confidently that even such an operation as this will permanently cure him. The limb retains its power of motion, which is of great advantage, but at the same time the loss of sensibility would expose it to trophic disorders which might prove disastrous. So far as the cure of the neuralgia is concerned, the small amount of evidence on hand is favorable, and I shall presently call your attention to the fact that when excision is undertaken for the cure of neuralgia of the fifth nerve, the result is much more successful the farther back in the course of the nerve the operation is done.

We may pass now to consider certain *affections of the cranial nerves*, to supplement those of the seventh or facial, which we have already studied.

This patient, a woman of sixty, has complete ptosis of the left eye-

lid, paralysis of the internal, superior, and inferior rectus, and dilatation of the pupil, indicating a *lesion of the third cranial nerve*, the motor oculi. This is an example of a class of cases in which it is extremely important to make an accurate diagnosis as to the nature and position of the disease, because the nerves of the eye lie close to many important structures within the skull, and we wish to know whether there is danger that these will also be involved; also because we wish to know whether the patient is likely to recover, or to be crippled in an important function.

If the paralysis be due to a peripheral perineuritis, such as causes the common form of Bell's palsy of the face, the patient will almost certainly recover in the course of a few weeks or months. The principal sign that would make us fear that the lesion is more serious than this is the involvement of other nerves, either of the same or the opposite eye. Is this sign present in this case? Certainly not, unless the following facts are indications of it.

The symptoms began with intense pain in the brow over the affected eye, and this continued for many days with unabated severity, but is now somewhat diminished, perhaps in consequence of the treatment which has been given (phenacetin and potassic iodide). Does this pain signify the involvement of the superior branch of the fifth nerve in an organic lesion? I do not think that this is the case. In the first place, there is no anæsthesia in the distribution of the supraorbital nerve, and, in the next place, we know that the eye is an important reflex centre, and that pain, especially in the forehead, is one of the commonest indications of irritations which involve either the globe itself or the muscles which move it. Besides this, the inflammation which caused the paralysis may indirectly cause the pain, just as the inflammation which causes facial paralysis almost invariably excites pain, which is generally felt behind the ear and in the back part of the head.

When you cannot positively satisfy yourself that paralysis of the third nerve is not due to syphilis, you should give the patient, by all means, the benefit of the doubt, and prescribe not a little but full doses of iodide of potassium, remembering that basal syphilis is the commonest intracranial form, and the onset is often insidious. In any case this treatment will do no harm, and if the paralysis be perineuritic ("rheumatic") there is no other except symptomatic treatment that is of material service.

There are many other points which might be referred to in this connection, but I will speak of only one, which is of distinct practical

interest. In most cases of paralysis of a single cranial nerve all its functions are involved, but this is not an invariable rule, and you cannot throw out a peripheral lesion on account of the incompleteness of the paralysis.

I indicated to you above that the different fibres composing a nerve sometimes show different degrees of vulnerability, and so it is not uncommon, in cases of pressure or of new growth (especially syphilitic growths) or of inflammation, involving the third cranial nerve, to find that some of the muscles supplied by that nerve remain unaffected, or relatively so. Of course, in the partial nuclear affections of the nerve this differentiation is still more marked.

[*Later Note.*—The patient was shown at the clinic for successive weeks, and made a good recovery in the course of two months.]

I wish next to speak of two cases of typical *chronic tic douloureux*, or *epileptiform neuralgia of the second and third branches of the fifth pair*. Both patients are women and in middle life; in both cases the origin of the disease is obscure, but I think that it started, as I believe it generally does, in an irritation from an ossified pulp-cavity or in some other disease of the tooth. Sometimes an injury is done to the nerve when a tooth is drawn, and sometimes there is a narrowing of the bony canals through which the nerves run. It is probable that this cause is especially frequent in the case of old people, who furnish the greatest number of sufferers from this affection. Of this one fact I am sure,—namely, that in almost all these cases well-marked neuritis is present. I have microscopically examined at least half a dozen nerves which had been excised by operation, and in only one case have I failed to find marked changes in the nerve-fibres, ending in destruction of the axis-cylinders, besides thickening of the connective tissue, and cellular infiltration.

It is a remarkable fact that the pain in each of the important neuralgias of the body has a characteristic form. Intercostal neuralgia is usually described as a sense of intense localized pressure, while sciatica has a number of characteristics, which I will not dwell upon. The chronic facial neuralgias are almost always of the “epileptiform” type, except that of the supraorbital nerve, which is apt to be regularly intermittent, suggesting a malarial origin. This is, at any rate, true of the acute supraorbital neuralgias.

In almost every kind of neuralgia there are usually two elements to be sought and found,—first, the element of peripheral irritation; next, a peculiar morbid condition of the nerve-centres. It is coming to be recognized more and more that, in the ordinary forms of neu-

ralgia, such as affect the extremities and the face, the element of peripheral irritation, usually due to neuritis, is generally present, and has to be distinctly considered in the treatment. When this is removed, the neuralgic tendency will often cease of itself. On the other hand, if the tonicity and vigor of the nerve-centres can be restored, and the habit of pain broken up, the peripheral irritation may cease to be injurious.

In the treatment of these severe epileptiform neuralgic seizures of the face there are many measures which are of more or less value, but the two most important, by far, are *excision of the affected nerve* and the use of *aconitia*.

Excision should be done as far back as possible,—that is, either at the exit of the nerve from the skull or as near it as we can get. An English surgeon (Rose) has recently excised the Gasserian ganglion. In this case the patient was relieved, but ulceration of the eye occurred, a result which he thinks could be avoided another time.

Aconitia may be used in doses of from one-four-hundredth to one-hundredth of a grain, repeated every three hours, and omitted if the patient feel faint or weak or has well-marked tingling of the fingers or other parts of the body. I say the fingers rather than the lips, because the mere presence of the drug in the mouth when it is first taken will sometimes cause the latter symptom. It is a remarkable fact that in the cases—which are not so very rare—where aconitia is of real and great service, a few large doses (relative to the patient's power of endurance, ascertained through gradual increase) will sometimes drive away the pain for a long period.

There are a number of other useful adjuncts to the treatment, such as galvanism in long-continued doses, ether or methyl spray, gelsemium, phosphorus, phenacetin, and, above all, absolute rest, with cod-liver oil, abundant nourishment, baths, massage,—in short, a full or partial rest treatment,—in case the processes of nutrition are depressed, as they so often are.

In my opinion, neither deep injections of osmic acid, chloroform, etc., nor nerve-stretching are much to be counted on, and they are more dangerous than a careful antiseptic operation for excision, even if it be a deep operation.

It is important to note that with many patients spontaneous cessation of pain for a longer or shorter period sometimes occurs, even without treatment, and it is such a cessation as this that we hope to obtain by making powerful impressions on the sensory nervous system by such drugs as aconitia. The operations seem to act partly as inhibi-

tory stimuli ; partly by cutting off the inflamed portion of the nerve (or a part of it,—the more the better), which acts as a source of irritative impressions upon the nervous centres ; partly by getting rid of the normal (but in fact irritative) stimuli coming from the large area of skin and muscles which the excised nerve supplied.

The periodic diurnal neuralgias of the supraorbital nerve, with their peculiar relation to migraine, deserve a special lecture.¹ Quinine, in large doses, four hours before the time of onset, is in them almost a specific, whereas in the epileptiform neuralgias it is of little avail.

¹ To be published in a succeeding volume.

DISSEMINATED SCLEROSIS FOLLOWING SYPHILIS.

REPORT AND DISCUSSION OF A CASE

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THE patient, L. S., is a man of fifty-five, with a good family history. He has had no hardships and no severe strain, either mental or physical. He is well-nourished and apparently quite happy, yet he presents to us a rich and instructive variety of pathological conditions.

In about 1860 he had a hard chancre, followed by non-suppurating swelling of the inguinal glands. In November, 1867, there was severe inflammation of both eyes, which lasted a month. In January, 1868, jaundice appeared, for which he was salivated. Two months later what appeared to be a severe attack of rheumatism of the knee and ankles set in and kept him in bed for five months. A similar attack in 1875 lasted seven months. Just after the first attack of joint-disease he was very deaf, but improved so as to hear tolerably well. From 1875 until 1882 he was apparently well, and worked steadily as a plasterer. It was, however, during this period, as nearly as can be ascertained, that three important symptoms first appeared : he lost the sense of smell, he began to confuse colors, and he had at times difficulty in articulation while reading aloud.

In 1882 power to raise the right arm above a horizontal position was lost in the course of a few days, so that he could not even take off his hat with the right hand—the result of paralysis of the upper part of the trapezius. Most of this disability gradually disappeared during a few months' stay at the Hot Springs of Utah, but the upper part of the right trapezius is still distinctly weaker and smaller than its fellow.

In 1885 he went to work in a smelter, where he was exposed to

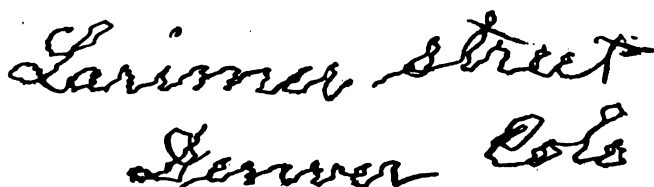
dust from lead ores, and soon had an attack of lead colic with blackening of the gums. He was treated for about ten days, and then returned to the same work, continuing it for over two years, when he engaged in his present occupation as a shopkeeper.

Within two months of the lead-poisoning he noticed a tremor of the right arm on attempting any movement. This gradually grew worse and the arm became weaker.

Two years later the right leg began to tremble in the same way. This tremor and weakness have slowly increased, and some time in 1889 the left leg began to tremble, though much less conspicuously than the right.

He suffered from typhoid fever in July, 1889, and from facial erysipelas in November of the same year. The patient first came under my observation in February, 1890, and notes of his condition were made as follows: Well built; six feet high; weight one hundred and seventy pounds; general appearance excellent. There is marked weakness of the right arm and leg, the power on this side being about three-fourths of that on the left. The right arm or leg begins to tremble so soon as any movement is attempted with it. This tremor increases in proportion to the effort, and is augmented by repeating the act that excites it. Its character is well seen when the patient carries a glass of water to his lips. At first the tremor is but slight, but the glass is shaken more violently as it is raised. Successive trials increase the difficulty, and at the fourth or fifth the water is apt to be spilled. Attention or emotion makes the tremor worse. It disappears entirely on cessation of effort. It is least annoying in the morning; worst at evening. At times it interferes seriously with writing. (Fig. 1.) In addition to the

FIG. 1.



The image shows a handwritten signature in cursive script. The first line reads "Larimer Street" and the second line reads "Denver Colo". The handwriting is somewhat shaky and irregular, consistent with the tremor described in the text.

tremor there are occasionally quick jerking movements of the right arm or leg.

The patient stands with feet apart. On bringing his heels together and closing his eyes, he sways and feels insecure, just as in locomotor ataxia. His gait is slow and stiff, with the feet well apart. He has difficulty in walking at night. There is no real ataxia, as he readily

touches various parts of his body with either hand or foot when his eyes are closed. Passive movements are but slightly resisted. The right knee-jerk is decidedly exaggerated; and the left is also above the average. The right wrist-jerk is excessive. The tendon reflexes of the triceps and biceps are equal on the two sides, but above the average. No true ankle-clonus can be obtained, but, on letting the patient rest the weight of the right leg on the toes with the heel raised, forcible depression of the knee elicits a tremor resembling clonus. This begins gradually and finally becomes quite violent. Its rate is three vibrations per second, whereas in clonus the rate is from six to nine per second.¹ In the same way a much less marked tremor can be brought out in the left leg. The right plantar, the palatal, and the laryngeal reflexes are excessive; the cremasteric is normal on each side. The skin is rather dry and the nails are brittle.

No defect in sensibility to pain, touch, temperature, pressure, or posture can be shown.

The eyes and eyelids move normally. There is no nystagmus in any position. The pupils react to light and accommodation, but the left is partially bound down by an old iritic vegetation adhering to the lens. The left cornea is slightly hazy. Vision in right eye $\frac{5}{x}$, left $\frac{5}{xv}$, with correction for hypermetropia. Red and green are confused with either eye. The color-fields are contracted. Red is seen only when close to the fixation-point. Green is not recognized at all, sometimes being taking for gray, sometimes for red or brown. (Fig. 2.) Ophthalmoscopic examination of the right eye reveals nothing abnormal. No satisfactory view of the left fundus could be obtained.

Hearing is impaired, right $\frac{A}{T}$, left $\frac{A}{T}$. There is bilateral otitis media, but the defect is largely in the inner ear, for the watch is not heard at all when pressed against the mastoid.

The sense of smell is absolutely lost.

Taste is not distinctly affected.

There is no tremor of the lips or fibrillary tremor of the tongue.

Speech is slow and distinct. There is at times considerable difficulty in articulation. The patient was formerly fond of reading aloud to his wife, but has entirely given it up on account of the thickness of speech that comes on after reading for a short time.

Sexual power is greatly diminished. Micturition is less easily accomplished than formerly. Tests of the urine, before and after a

¹ Gowers, *Diseases of the Nervous System*, Am. ed., p. 87.

FIG. 2.

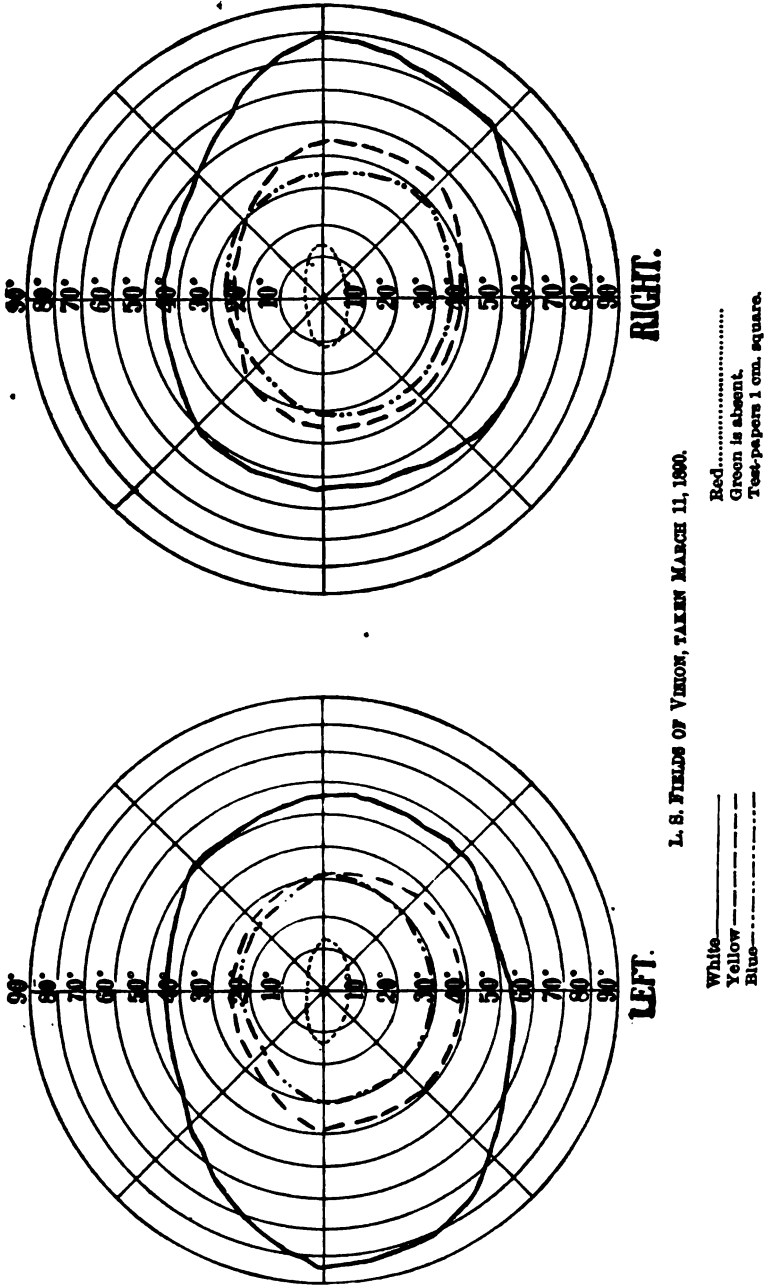
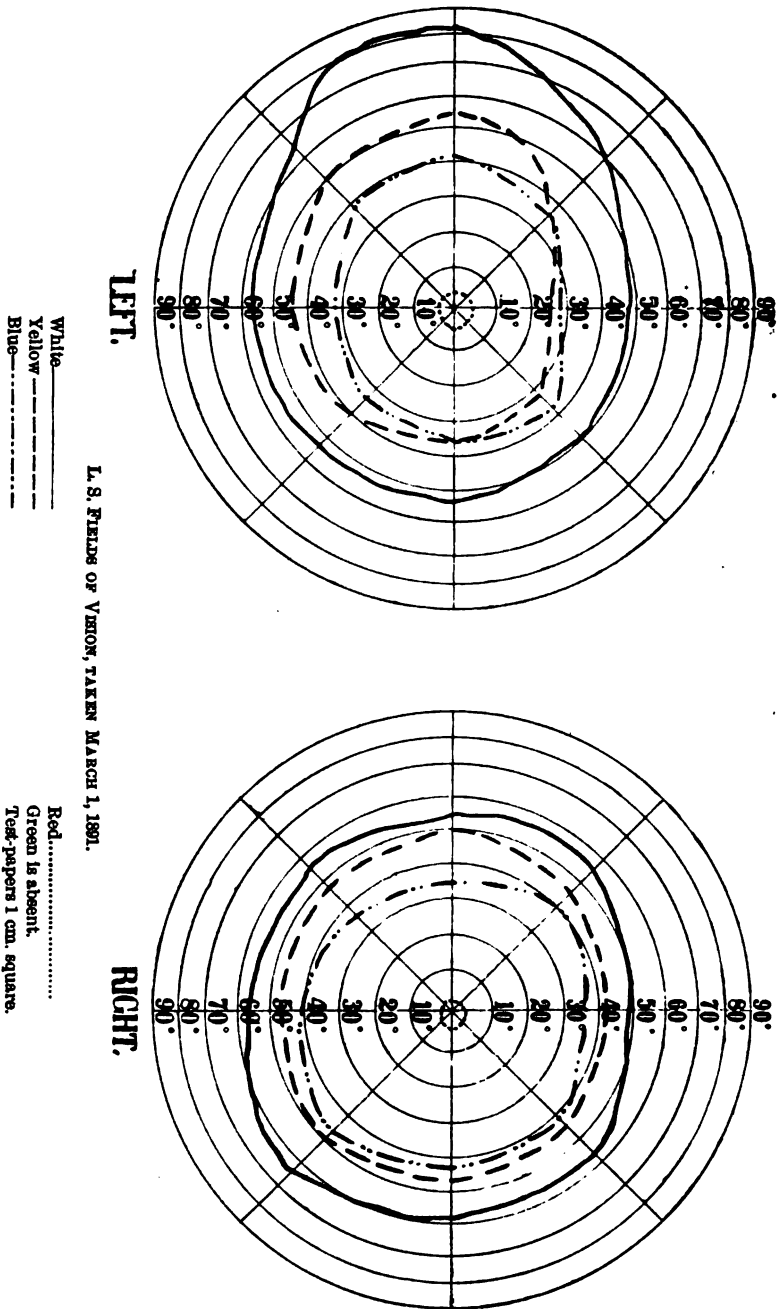


FIG. 8.



short course of potassium iodide, show it to contain no lead and to be normal in other respects. There is no lead line on the gums.

Memory is somewhat impaired.

During the next two months the administration of silver nitrate, one-third of a grain three times daily, seemed to diminish the intention tremor and rigidity of the limbs, and at the same time there was a gain of about ten pounds in weight. Improvement then ceased and treatment was abandoned. On March 1, 1890, the patient was re-examined, and the following facts noted :

The tremor remains the same. The knee-jerks are exaggerated, but apparently not so much so as at first, and they are more nearly equal. The wrist-jerk and elbow-jerk on the right side are distinctly greater than on the left. There is considerable resistance to passive movements of the legs and right arm. The gait seems rather more stiff and awkward, but Romberg's symptom, which was marked a year ago, is no longer present, the patient standing quite well with eyes closed. Speech and hearing remain the same. The pupils are strongly contracted, and the left is smaller than the right. They react very slightly either to light or accommodation. Central vision is unchanged, except that it rapidly deteriorates after looking at the test-card a few moments. The right field is distinctly contracted for white on the outer side. Red has almost disappeared from each field. (Fig 3.) There are no scotomata. The ophthalmoscopic examination is unsatisfactory on account of the strong contraction of the pupils, and it is not expedient to dilate them. There is insufficiency of the internal recti, but not enough to cause diplopia.

The weakness of the bladder is more annoying, and it takes a long time to empty the organ. Sexual power is still further diminished. Memory is said to be considerably impaired, as shown by the failure to recall events accurately and also by difficulty in making simple arithmetical calculations, but general intelligence seems excellent. The patient is easy-going and cheerful. He laughs heartily at the small dimensions to which the red fields have shrunk, and does not seem at all concerned about his disease. On the whole, it is plain that there has been a slow but distinct advance during the year. The nitrate of silver treatment has been resumed.

The clinical picture presented by this case is certainly a large and richly variegated one, but pathologically there is more unity in the variety than at first sight appears.

We have as a secure starting-point primary syphilis; then, some years later, inflammation of the eyes (kerato-iritis, as shown by the

remaining iritic vegetation and hazy cornea), acute jaundice, subacute inflammation of joints and deafness, all occurring within a few months, and all, as I believe, manifestations of syphilis. From sixty to eighty per cent. of all cases of plastic iritis are syphilitic.¹ As is well known, the liver is a common seat for gummata, which may cause jaundice by pressure on a bile-duct. The disease of the joints was diagnosed as rheumatism, but this is entitled to no confidence whatever. Syphilitic arthritis simulating subacute rheumatism is not uncommon.² It will be noticed that both attacks of arthritis were of long duration. Finally, the deafness was also probably due to syphilis. A specific inflammation of the inner ear is liable to occur when the disease is active.³ The virulence of the poison seems to have been exhausted by this vigorous demonstration until the second attack of arthritis, seven years later. So far syphilis furnishes a clear and highly probable explanation of all the phenomena.

During the next six or seven years we have the gradual, almost imperceptible occurrence of impaired color sense, loss of smell and embarrassed speech. These symptoms are evidence of scattered focal lesions quite different from the ordinary manifestations of syphilis, and would alone almost justify a diagnosis of disseminated sclerosis, but when we have the addition of sudden paralysis of a part of a single muscle, followed later by spastic paresis, with the thoroughly characteristic intention tremor, the diagnosis is fully established, even without the additional confirmation furnished by weakness of the bladder and impotence. Lead-poisoning sometimes causes a tremor, but not intention tremor; it attacks by preference the extensors of the wrist and fingers and the deltoids, which are free in this case. Moreover, there was no exposure to lead until after the occurrence of distinct symptoms of multiple sclerosis, so we are forced to conclude that the plumbism, like the typhoid fever and erysipelas mentioned in the history, has no relation to the important symptoms. Multiple or disseminated sclerosis has its anatomical basis in isolated patches, scattered apparently at random throughout the nervous system, in which the connective tissue is increased and the nervous elements degenerated, the axis-cylinders, however, persisting longest. This makes possible a great range in the combination of symptoms. Nevertheless, the cord and certain regions of the brain are involved

¹ Hyde, article "Syphilis," Wood's Reference Hand-Book.

² Howard Marsh, *Diseases of the Joints*, chap. xi.; Barwell, chap. vii.

³ Kipp, *Syphilitic Affections of the Ear*, Appendix, Wood's Reference Hand-Book.

with enough constancy to give to most fully-developed cases a very definite stamp of individuality. These are characterized by four cardinal symptoms: intention tremor, paresis becoming spastic with exaggerated tendon-reflexes, a peculiar speech-disturbance, and nystagmus. In the case under consideration all these symptoms, except nystagmus, are so distinct that the diagnosis is easy. Tremor, absent during rest but appearing when a movement is attempted,—that is, intention tremor,—is the most important symptom. It formerly caused the disease to be confused with paralysis agitans, but the distinction is now very easy in most cases, for the tremor of paralysis agitans is continuous during the rest of waking moments and is diminished by effort. The paradoxical cases,¹ in which this distinction is reversed, are in but small proportion to the whole number.² Three explanations have been offered for the intention tremor of multiple sclerosis. Charcot attributes it to the unequal loss of conductivity in the axis-fibres; Strümpell, to cross conduction of impulses to adjacent fibres, owing to defective insulation; and Erb, to interference with some co-ordinating mechanism in the crura and pons. I think the facts support Erb's view, for the tremor does not occur when the pons and crura are free from the lesions. Moreover, it does occur sometimes when a tumor involves this region.³ This suggests a possible difficulty in diagnosis, but such a tumor usually reveals itself very clearly by the severe headache, choked disk, characteristic palsies, and increasing stupor. Paretic dementia, which is in some respects allied to multiple sclerosis, may also exhibit intention tremor. In these cases it is probable, though not proved, that there are patches of degeneration in the pons or crura. It is scarcely necessary to say that in paretic dementia the psychic symptoms are very prominent. The only difficulty is in rare cases of multiple sclerosis extensively involving the cortex. The mental condition may then be precisely like that of paretic dementia, and the diagnosis may be impossible. The usual mental state in disseminated sclerosis is impaired memory with an unnatural cheerfulness or complacency, but sometimes irritability and despondency are prominent.

The speech-defect of disseminated sclerosis is different from that of paretic dementia. The voice is monotonous and articulation slow, the syllables being sounded as in the scanning of Latin poetry. In paretic dementia it is much more confused and suggests intoxication.

¹ Putzel, article "Paralysis Agitans," Wood's Reference Hand-Book.

² Gowers, *op. cit.*, p. 928.

³ Gowers, *op. cit.*, p. 888. Bramwell, *Intracranial Tumors*, p. 72.

The motor symptoms of disseminated sclerosis may take the form of simple spastic paraplegia and so suggest lateral sclerosis. Intention tremor or any other cerebral symptom would be decisive against this diagnosis, but when the lesions are confined to the cord any one might be mistaken as Charcot¹ was in one case. But even then anæsthesia may prove the existence of multiple lesions, or great variability in muscular power may point distinctly to multiple sclerosis.

In our case one very important symptom is absent, namely, nystagmus. This oscillation of the eyeballs, apparently a sort of intention tremor, is of great diagnostic value when present. Proportionately it occurs ten times oftener in multiple sclerosis than in all other nervous diseases taken together. It is absent, however, in forty-two per cent. of the cases.² Other ocular symptoms are of great importance. Pronounced paralysis of one or more ocular muscles occurs in one-sixth of the cases. Degrees of insufficiency not causing diplopia or decidedly limiting movement are more common. Some impairment of vision occurs in about half the cases, and is due to sclerosis of the optic nerve. It may reach a considerable degree and yet the ophthalmoscope show no change in the papilla. On the other hand, optic neuritis may be present, or loss of the red reflex of the disk may give conclusive proof of atrophy while the acuity of central vision remains normal. In cases where central vision is impaired or any pathological change in the disk is noted, defect in the visual field is very constant. Uhthoff carefully measured the fields in twenty-four cases and found defects in all. The most common was central scotoma, either absolute or for certain colors only; this occurred fifteen times. Contraction of the fields, for colors alone or for white and colors, without scotomata, as in the case under consideration, occurred nine times. As a rule, the shape of the contracted field is remarkably regular compared with that of tabes. The color-fields may contract until they are limited to a very small area about the fixation-point and then disappear, violet, normally the smallest, going first, then green, then red. Yellow and blue persist longest. (Figs. 2 and 3.)

While impairment of vision is more common than in tabes it is not apt to be so serious. Instead of steady progress towards blindness we have in many cases great variability. After great deterioration there may be complete recovery. Permanent blindness is a rare exception. Loss of hearing, smell, or taste occasionally occurs in mul-

¹ Œuvres Complètes, tome ii. p. 321, foot-note.

² Uhthoff, Augenstörungen bei der Multiplen Herdsclerose, Archiv für Psychiatrie, xxi. Band, 1 und 2 Heft.

tiple sclerosis and may add to the evidence of scattered lesions. Impairment of the bladder and of virility is usually slighter than in tabes, as it is in this case.

In our patient the rapidly-developing paralysis of the trapezius is of great interest because it occurred several years before the tremor, and was the first obtrusive symptom that can be definitely assigned to multiple sclerosis. Even at that time the disease could probably have been recognized provided the possibility of its presence had been borne in mind, motion, sensation, and the reflexes tested in the routine manner, the visual fields mapped out, and inquiry made as to the condition of speech. Our text-books give us but little assistance in making an early diagnosis. They describe the fully-developed disease with its unmistakable symptom-complex, but are nearly silent as to the mode of onset. To get a more accurate knowledge of the beginning of the disease I have studied the history of fifty-four cases, reported from various Berlin clinics by Uhthoff¹ and Freund,² with the following results:

First Obtrusive Symptom.	No. of Cases.
Weakness in one or more limbs	25
Amblyopia	11
Diplopia	5
Tremor	4
Scanning speech	2
Dizziness	3
Headache	2
Apoplecticiform attack	1
Spasm without unconsciousness	1

Thus the onset is marked by muscular failure in nearly half the cases and by amblyopia in one-third of the remainder. This weakness commonly attacks the legs first, and it very often comes on suddenly or rapidly. It is not rarely accompanied by numbness or formication, and when tests have been made a corresponding anæsthesia has been found. In one of these cases, put down as beginning with muscular weakness, amblyopia of the right eye appeared simultaneously with paresis of the right leg and arm; in another diplopia and alteration in speech were coincident with paresis of both legs.

The amblyopia, with which one-fifth of the cases began, was mostly sudden or rapid in its development, and was usually followed by considerable and often rapid improvement. In only four of the

¹ Op. cit.

² Archiv f. Psychiatrie, xxii. Band, 2 und 3 Heft.

eleven cases did it appear gradually. The left eye alone was first affected in five cases, the right alone in two. In a majority of these cases the other eye was subsequently attacked in the same way.

Now, these symptoms, muscular weakness or amblyopia, by which multiple sclerosis so often announces its advent, are precisely the ones that suggest hysteria. In one case of sudden paraplegia this very serious mistake was made, although the patient was a man. If a young woman suddenly loses the power to walk, but recovers within a few weeks, or suddenly loses the sight of the left eye and then rapidly regains it, only the most careful and thoughtful examination will eradicate the idea that it is hysterical. In our patient loss of faradic irritability in the trapezius could doubtless have been detected, for there is still some atrophy. In cases of amblyopia optic neuritis, or more commonly optic atrophy, may give decisive proof of organic disease. But in multiple sclerosis weakened muscles often show no change in electrical reaction, optic neuritis is on the whole rare (five or six per cent.¹) and transitory, while optic atrophy is often very inconspicuous. Therefore the necessity for a thorough study of the differences between incipient sclerosis and hysteria is quite evident. So far as I know the only man who has attempted such a study is Buzzard.² In an admirable article he describes a number of cases of incipient sclerosis mistaken for hysteria, and gives the following differential points:

Paraplegia is apt to be flaccid in hysteria, spastic in sclerosis. Paralysis or blindness is usually more complete in hysteria than in sclerosis. Shifting of loss of power to the opposite limb or of amblyopia to the other eye, with recovery of the one first attacked, is evidence of sclerosis, not of hysteria; and the contrary opinion is due to so many cases of multiple sclerosis being used for the description of hysteria. Clumsy movements before and tremor occurring after an object is grasped indicate hysteria. Muscular atrophy and change of electrical reactions of course cannot be due to hysteria. Atrophy of the optic nerve, which occurs in a large proportion³ of cases of multiple sclerosis, necessarily implies organic disease.

To these differences should be added the evidence afforded by the state of the visual fields which Buzzard appears to have ignored. Simple contraction of the white- or color-fields occurs in both diseases, but scotomata, which are common in multiple sclerosis, have, so far as

¹ Uhthoff, loc. cit.

² Brain, 1890, Part I.

³ About half of the cases, according to Uhthoff, but the atrophic pallor is often so slight and partial that only an expert can be sure of it.

I know, never been found in hysteria. These should be carefully searched for, but an expensive perimeter is not necessary. A black-board properly marked, and some bits of white and colored paper a centimetre square on blackened cards, are sufficient apparatus.¹

The prognosis of multiple sclerosis is absolutely bad, but it may be relatively good. No case of recovery is known, but the disease usually runs a long course, and until the end is near the patient may be fairly comfortable. Our patient seems quite as happy as most men, though the disease has certainly lasted nine years, probably longer. The two examinations, a year apart, show its progress to be very slow, so we may hope that the inevitable end will be postponed for many years to come. Sooner or later, unless some intercurrent affection interferes, the increasing weakness of the disease, with possible bed-sores, cystitis, or other tortures, will end a miserable existence.

Treatment must be directed to the relief of symptoms and the retardation of the process.

Nitrate of silver, as happened in this case, often gives considerable relief for a time. While it is not lasting the remedy should be fairly tried for some months in one-fourth- to one-third-grain doses after meals. When the total quantity approaches a drachm an interval of some weeks with perhaps a little potassium iodide is advisable to avoid danger of argyria. Arsenic in small continuous doses may possibly retard the disease. Warm baths relieve the stiffness when it becomes annoying. Electricity has not yielded any results that pay for the trouble and expense of its use, except the relief of neuralgic pains, which are not often prominent. Hygiene is of great importance. Multiple sclerosis sometimes seems to have a psychic cause, and there can be but little doubt that distress, mental or physical overwork, and alcoholic or sexual excesses, may greatly hasten its progress. The daily life of the patient should be carefully scrutinized, and all unfavorable factors should be as far as possible eliminated.

¹ See article on Optometry, Wood's Reference Hand-Book.

Ophthalmology.

ANTISEPTIC OPHTHALMIC SURGERY.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA POLYCLINIC.

BY EDWARD JACKSON, A.M., M.D.,

Professor of Diseases of the Eye in the Philadelphia Polyclinic; Surgeon to Wills Eye Hospital, and Ophthalmologist to the Rush Hospital, Philadelphia.

IN view of the important part that studies of ocular inflammations have played in shaping the popular professional conceptions of inflammation in general, it might seem surprising that the application of so-called antiseptic methods in ophthalmic surgery has had so little to do with their development or the general estimation in which they are now held. The studies of the process of suppuration in the cornea and the observations on the influence of drugs, notably mercury, in iritis are constantly referred to in the literature of former years as the foundations on which all theories and conclusions about inflammations in general must rest. But antiseptic surgery has established itself by its achievements in amputations, in the treatment of compound fractures, in the safe opening of the abdominal and other great cavities of the body; while in this matter of antiseptics the ophthalmic surgeon is rather a follower or imitator. When, however, we come to reflect on the subject we find in the essential conditions of ophthalmic surgery good reasons why this should be so.

When Lister forced upon the attention of the profession the importance of the bacterial element in the complications of wound-healing, wound-sepsis was playing a smaller part in the production of "unfortunate" results in this than in almost any other department of surgery. The wounds inflicted in ophthalmic operations are so small that the dirty hands of the operator and his assistants never had a chance here to play an important *role* in the tragedy of wound-infection. Then the instruments introduced within the eye were usually smooth, polished, cutting instruments, the necessity for preserving the perfectly smooth, delicate cutting edges of which secured thorough cleansing, while when other instruments, like the forceps, were intro-

duced, the part with which they came in contact was often immediately cut off and entirely removed. The dictum, that the fewer the instruments introduced into the wound the better, was generally accepted, and practice in accordance with it of course diminished the chances of infection by instruments. The ideal operation, too, was the one in which the thing attempted was done with the least possible unnecessary injury of tissues by the instruments, and so the least possible chance of the lodgement of pathogenic germs, and in eye-surgery "nice" operations were generally expected. Thus the ophthalmic surgeon practised aseptic surgery, as the rustic had talked prose all his life, without knowing it, and just in proportion as sepsis was thus unknowingly prevented, the improvement by its complete prevention through intentionally antiseptic measures was the less notable.

Certain peculiarities of the eye limit the use of some of the most reliable and popular antiseptic substances, and compel considerable departures from the modes of dressing applicable to other parts. The eye is extremely sensitive to the influence of mechanical or chemical irritants, and in health there is constantly passing through the conjunctival sac a considerable amount of watery and mucoid secretion, which in any inflammatory condition is enormously increased, even if it be prevented from becoming purulent in character. If the attempt be made to keep on the eye a permanent dressing, such as may often be applied to operation-wounds elsewhere, these secretions either make their way along the surface of the skin, establishing a communication of albuminoid solution between the wound and the external air, or if taken up by an absorbent dressing, the removal of the watery portion of the discharge leaves a dried mass in contact with the skin of the lids that will generally prove so irritating that the patient cannot resist the impulse to disturb the dressing at the risk of disturbing the apposition of the parts; or the effort of self-control may bring about a condition of nervous erethism quite adverse to the normal progress of the healing process.

To avoid these dangers, it is usually needful to remove and renew eye-dressings at least once daily. This necessity makes it of special importance that the atmosphere and necessarily the whole surroundings of the patient be kept aseptic. By a sufficiently large and accurately applied dressing it may be possible to exclude infection even in very unfavorable surroundings, provided that the dressing can remain undisturbed; but when, as for reasons given above, or in order to guard against such accidents as prolapse of the iris after cataract-extraction, it is necessary to re-expose the wound frequently, the most scrupulous

cleanliness of all the surroundings is of much greater importance. Dr. H. D. Noyes recently, in reporting a case, ascribed with great confidence the serious complication of the healing process to the defective plumbing of the room in which the patient had been treated; and many an ophthalmic surgeon knows from sad experience the baneful effect of a single suppurative case in his operation-ward.

The need of changing the dressing makes the antiseptic solution with which the part is to be cleansed at the time of such change an important matter, while the irritability of the eye prevents the use of solutions found to be elsewhere most reliable. Carbolic-acid solutions in any efficient strength, strong alcohol, etc., are thus excluded, while the freedom of using mercuric chloride in the strength of one to one thousand or over is very much restricted. A similar restriction for a different reason (the danger of systemic poisoning), in abdominal surgery, seems to have shown that by far the most important antiseptic in any of our antiseptic solutions is pure water. Experience in eye-surgery points in the same direction. While for certain special purposes there may be a really important gain by adding to the water certain chemical germ-destroyers, such gain is probably always subordinate to the advantage derived by the free washing of the parts with water. This accounts for the really excellent showing made by the free use of some solutions the microbicidal power of which must be regarded as quite insignificant, such as the solutions of boric acid, or some of the supposed solutions of mercuric iodide that have been used. In the case of the recently-proposed pyoktanin, it is not unlikely that most of the good effects reported from its employment are due to the one thousand parts of water rather than to the one part or less of the pyoktanin.

This idea of the importance of the watery element in our antiseptic solutions has direct practical bearing on the manner of using them, for it follows that the solutions act in the main mechanically, carrying away from contact with the tissues those matters which might serve as sources of infection. This action is proportioned to the freedom and force with which the solution is projected against the tissues. In the present state of our knowledge, we must believe that the antiseptic solution is the most gentle means of applying the mechanical force necessary to the cleansing of the tissues, and that the manner of using the solution, and the freedom with which it is used, are of more importance than its chemical composition.

The chemical constitution of the solution is, however, not a matter of indifference. A solution that has the power of promptly devitalizing all germs that fall into it, and thus always keeping itself surgically

clean, has obvious advantages. Of most thoroughly established reputation in this respect are the solutions of mercuric chloride. These may be used in strengths of from one in eight thousand to one in one thousand. The stronger of these is almost always very irritating to a normal eye, though it may not notably increase the irritation of an eye suffering from such a disease as purulent conjunctivitis. The weaker solution mentioned rarely causes notable smarting or hyperæmia. Solutions of one to five thousand or weaker may be used as eye-washes in conjunctivitis or to cleanse the eye when it is being dressed after an operation. In the latter case they are greatly preferable to simple water when there is any likelihood of contamination through the atmosphere. The stronger solutions are to be used for the repeated cleansing of the conjunctival sac in purulent or partly purulent inflammations of the conjunctiva and cornea, and in the thorough cleansing of the eye prior to an operation. In the latter instance the use of the mercuric solution should be preceded by the efficient use of pure water, or of soap and water, followed by sufficient pure water to remove all traces of soap, with especial attention paid to the eye-lashes. The antiseptic solution is then carefully and abundantly worked into all folds and crypts of the conjunctiva and about the lashes, where currents of fluid of considerable mechanical power cannot be made to act, and some little time should be allowed before it is permitted to run away or to become considerably diluted with other fluid. In this way I commonly employ a solution of one to three thousand; and, although it often causes marked œdema and hyperæmia of the conjunctiva, which may last for two or three days, the immunity from infection that it secures in serious operations more than compensates for the irritation caused.

Of course, if an equally efficient and reliable antiseptic that is less irritating can be found, it will to that extent be superior to the mercuric-chloride solutions. It is not unlikely that we have such a preparation in the solution made by adding mercuric iodide to a solution of potassium iodide. Experimental researches seem to indicate that the mercuric iodide is an efficient antiseptic in weaker solutions than the chloride, and when used in such solutions it is less irritating. The strengths usually employed are about one-third those of the chloride used under similar circumstances; but that these solutions are quite as efficient as those of the chloride in actual clinical work I am not entirely satisfied.

Pyoktanin is the name under which purple and yellow aniline dyes have been introduced as antiseptics of great penetrating power,

efficient, and unirritating. It has been used in solutions of from one in five thousand to one in five hundred. Rapidly-accumulating experience seems to show that the claims originally made for it are without sufficient foundation. In inflammations of the interior of the globe it seems powerless, in corneal disease it may be positively harmful, and only in the treatment of purulent conditions of the lachrymal sac is there any general agreement that its solutions are of special value. Its penetrating power is probably only its power of following without disturbing the lymph-currents of the tissues. In the case of inflammations set up locally by infection, these currents set strongly from the sound or recently-invaded tissue towards the focus of inflammation, or the free surface. In suppurating corneal ulcers its penetrating power, as shown by the staining, is slight.

A use of antiseptic solutions of considerable importance is that for the cleansing of the anterior chamber when it contains pus (hypopyon), or when it is suspected that infection is liable to have occurred through a foreign body penetrating it, or through the introduction of possibly contaminated instruments. For this purpose the stronger mercuric-chloride solutions are quite unsuitable. A weak solution of the iodide may be used, but distilled water or a two- or three-per-cent. solution of boric acid is best for this purpose. The fluid is to be introduced through an incision in the most dependent part of the cornea, and allowed to escape freely through the same opening. It may be injected with some force, say with a head of ten inches or upward, if a fountain syringe, like that devised by Lippincott, of Pittsburg, be used. The washing out of the anterior chamber, though not very prolonged, should be thorough.

Probably the best agent we possess for penetrating and disinfecting tissues that are just becoming involved in a local centre of inflammatory infection is heat. It has been proposed to use hot-water stupes, with the idea of destroying bacterial forms that possibly cause certain conjunctival inflammations, and, when we remember that such stupes can often be applied at a temperature of 150° F. or upward, the proposition seems not irrational. The application of heat by the galvanic cautery or other form of actual cautery to suppurating corneal ulcers constitutes a very efficient antiseptic measure. In making such an application the tissue around the ulcer should first be minutely examined, to determine carefully the probable limits of infection, and then all within this limit should be destroyed. Great care should be taken not to burn more of the surface than is needful, while infected deeper tissue is allowed to escape. The disadvantage of using the cautery is

the opaque cicatrix that it leaves, though this is often not to be weighed against the prompt limiting of the infective process. In many cases, however, the spread of infection can be entirely checked by resorting to mechanical disinfection, by thoroughly scraping away all softened tissue, and then douching the surface with a strong solution of mercuric chloride.

The problem of the disinfection of the instruments used in eye-surgery is peculiar in respect to the delicacy of some of them and the great necessity for the preservation of the perfect keenness of their cutting edges. In general, those instruments that are in every part smooth, highly polished, and entirely free from crevices or re-entering angles where foreign matter can become lodged—instruments such as knives, needles, corneal spatulas, and the like—are quite readily cleansed. Simply washing them thoroughly in pure water is all that is required. It is, however, essential that such instruments be kept always perfectly polished. Any spot that becomes rusted or tarnished cannot be perfectly cleaned in this way, or in any other way, that does not endanger the keenness of the edges.

Instruments, like forceps, that have comparatively rough surfaces, angles, and crevices require very different treatment to render them thoroughly aseptic. With them we may resort to the standard antiseptic solutions, like those of mercuric chloride or carbolic acid, which, by impairing the polish of smooth instruments, would make them permanently harder to keep clean. Even with such instruments efficient chemical solutions are injurious, by roughening the parts that are polished. Then, too, the penetrating power of these solutions if they encounter any mass of albuminous material that may be filling some crevice is small. The free surface of the instrument may be disinfected, but by coagulation the deeper portions are protected from contact with the solution, and may remain virulent. Here, again, we do well to have recourse to the penetrating and disinfecting power of heat. By placing the instruments for a little time in hot or boiling water, all parts of such albuminous masses as may be present will be thoroughly disinfected. On the whole, boiling water is decidedly the best disinfectant for eye-instruments, and even with the most delicate cutting edges a temperature can be employed that will be fatal to nearly all active forms of bacteria. Next to it in general applicability is stronger, or absolute, alcohol. This is said to affect the cutting edges, but I have not found that brief exposure to its influence does so at all.

The instruments when cleaned must, of course, be kept clean until used. On this account, the final disinfection is usually an immediate

preliminary to their use. If for any reason it is best to remove the instruments from the disinfecting fluid before they are to be used, they should be completely covered from the atmosphere with absorbent cotton. Of course, after the operation their speedy and thorough cleaning is essential to the preservation of their polish.

After the completion of an operation such as the extraction of cataract, involving the opening of the eyeball, the thorough cleansing of the eye is to be effected, not with strong antiseptic solutions, but with pure water or the boric-acid or weak mercuric-iodide solutions. The antiseptic dressing is then applied. It consists essentially of a sufficient mass of absorbent cotton, closely adapted, and retained in position with a roller or some other form of bandage, or with strips of adhesive plaster.

The dressing should not, however, in any case be applied so tightly as to prevent or seriously interfere with drainage. This rule has been most seriously transgressed after enucleation of the eyeball, and sometimes, perhaps, with the fatal result of infection extending to the meninges of the brain. It may in a few cases of very excessive hemorrhage be proper to pack the orbit and keep it under firm pressure for a few hours. In such cases the danger from hemorrhage may overshadow the other danger, while the free bleeding practically removes the danger of infection. It must be remembered, however, that a safeguard against wound-infection, of far greater importance than all our special precautions, is the free outflow from every point of the cut or torn tissues of blood and lymph, a stream against which the micro-organisms can hold their own only when given the advantage of lodgement in some protected location.

Now that cocaine is used so nearly universally in ophthalmic operations, its power of lessening the outflow of blood and lymph from the cut tissues is a factor not to be forgotten in considering our subject. To this influence, I think, are most rationally ascribed the unusually large number of cases of serious suppuration that occurred among the early operations done under its anæsthetic influence. Probably had cocaine been introduced before the era of antiseptis, this effect of its use would have been very seriously against it. As it is, it is only needful to use it in moderate quantity (two or four per cent. solutions are strong enough for eye-work) and to keep the surfaces thoroughly irrigated during the period of their exposure for the operation. These precautions must be observed, or we have in cocaine a power of giving material aid to the minute enemy against which our antiseptic warfare is waged.

Briefly then to recapitulate, the points to which I have endeavored to direct your attention are that—

Ophthalmic surgery was to a large extent and in the best sense aseptic before antiseptics began to attract the attention of the profession.

Permanent dressings not being practicable for the eye, all the more care must be taken to have all the surroundings aseptic.

The most important element of our antiseptic solutions is the contained water. The germicidal powers of the chemicals that we add to them are less important than their thorough application.

The reliable chemical antiseptics of most value are the mercuric chloride and the mercuric iodide.

The washing out of the anterior chamber is a safe and important antiseptic procedure in many cases.

Heat is the only known reliable antiseptic of considerable penetrating power.

Instruments are to be disinfected by hot or boiling water, though for smooth, polished surfaces this is not necessary.

Free drainage of blood and lymph from all cut or torn surfaces is the best barrier against infection; and cocaine, as tending to check it, is to be used with caution.

Dermatology.

PSORIASIS; SARCOMATOUS TUBERCLE; DEGENERATION OF SEBACEOUS GLANDS; CHRONIC SQUAMOUS ECZEMA; ACNE ROSACEA.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY HOSPITAL.

BY LOUIS A. DUHRING, M.D.,

Clinical Professor of Skin Diseases in the University of Pennsylvania.

PSORIASIS.

THE first case to be presented is that of a young man who has numerous inflammatory squamous lesions upon the skin, in the form of large and small patches, occupying the trunk. The disease is well-defined psoriasis, and of the gyrate variety, this peculiar configuration of gyrate or serpiginous lesions forming in some places a festooned appearance. It is formed by lesions situated near one another growing together and coalescing. Scaly manifestations of this character are met with in psoriasis, syphilis, and eczema, more especially the two first named, and hence the diagnosis is not difficult. In syphilis, apart from the history, the skin is usually more thickened and the scales more adherent and less abundant than in psoriasis. In the case before us the scales have a dull dirty-yellowish tinge, especially on the back, owing to the presence of sebaceous matter, as shown by the fatty, greasy feeling of the scales when taken between the fingers. The scales are loose and can be readily scraped off with the fingernail in large flakes or masses. Owing to the activity of the sebaceous gland, the peculiar, dry, glistening, silvery character of the scales, generally present in this disease, is wanting. The disease is manifestly chronic, and from the patient we learn that it has existed for ten years, more or less persistently.

Psoriasis is an emphatically chronic affection, and the treatment is usually attended with difficulties, and in most cases extends over a period of months. It is the most rebellious of all the inflammatory diseases of the skin. Patients often visit one physician after another,

through a period of months or years, without receiving benefit or being relieved. As a rule, it yields only to the most energetic treatment, either internal or local. Some cases do well under arsenic and full and increasing doses of iodide of potassium, while others are made worse by these remedies. Sometimes alkalies, such as the liquor potassæ, in ten- or fifteen-minim doses, prove valuable, especially in those cases where the disease is of a highly-inflammatory type and the heat and itching are distinctive symptoms. But the patient before us is a spare, poorly-nourished person, and the disease of a sluggish, cold, inflammatory type, and hence arsenic will probably prove the most valuable of the various remedies used internally. Arsenious acid, one-thirtieth of a grain three times a day in pill form, will be ordered, to be increased in a week or two to one-twentieth of a grain.

The local treatment is of the utmost importance in all cases of psoriasis, and a great deal can be done towards giving relief and even curing the disease. Chrysarobin is perhaps our most valuable remedy, and, employed judiciously, as to mode of application and the strength of the preparation applied, it usually acts happily. The chief objection to its use is the fact that it stains the skin, hair, and nails a yellowish, brownish, purplish color, and, moreover, stains the linen clothing indelibly. In weak strength, however, these objections can be largely overcome, especially if the patient use care in the mode of application. In the case before us we will prescribe the following ointment:

R Chrysarobini, gr. x;
Picis liquidæ, gr. xv;
Lanolini,
Ung. aquæ rosæ, aa ʒiv.
M. Ft. unguent.

Sig.—To be rubbed in thoroughly twice a day.

This application should be made after the scales have been removed with soft soap and water, and by means of a warm bath daily for half an hour or longer. There should be decided improvement noticeable in a week.

CASE II.—The next patient is a well-nourished, healthy-looking young woman, who likewise exhibits psoriasis, which she states has existed for nine years. The disease occupies symmetrically both arms and forearms, neck and chest, in the form of large, hand-sized, solid areas, sharply defined in outline, with a tendency to be crescentic. The patches are deep red in color, and are covered with small grayish scales,

particularly abundant around the margins. There are but few patches present, and they are all large. The disease also exists in the scalp, where the patches are broken up and are difficult to locate, the whole surface being more or less scaly. She states that the skin has been constantly affected since the disease began, nine years ago, and that the various remedies used, both internal and local, have never proved curative. An ointment of pyrogallol, ten or fifteen grains to the ounce, will be prescribed, to be rubbed in twice daily in small quantity.

SARCOMATOUS TUBERCLE.

This man, aged sixty-five, has a large, pea-sized, firm, pale-red, tubercular lesion on the bearded part of the side of the neck. He applied for advice three months ago, when the same kind of lesion existed. This was removed by scraping with the curette, but it has recurred, and in the same form. The disease is sarcoma, of the spindle-celled variety, as was previously demonstrated by the microscope. As a primary growth, it might be mistaken for epithelioma, and for a tubercle due to the trichophyton fungus (tinea sycosis). The treatment will now consist of excision and the subsequent application of the following :

R Pyrogallol, ʒ ii;
Emplast. resinæ,
Emplast. saponis, aa ʒ iv.
M. Ft. unguent.

This should be applied continuously for a week or two, until a slough forms. The wound will then probably heal, with a complete cure.

DEGENERATION OF SEBACEOUS GLANDS.

This man, stout and florid, about thirty-five years of age, exhibits on his face and neck, especially upon the sides, multiple degeneration of the sebaceous glands. The skin is congested in patches, the glands active, as in seborrhœa, and the skin covered with small sebaceous crusts. In some places the degeneration has progressed so far that minute crusted ulcers exist, constituting a mild expression of epithelioma. There are several such on the cheeks and on the neck. The disease should be treated with sulphur ointments and lotions, as in the case of seborrhœa, while the little points of ulceration may be made to heal and cicatrize by first applying some mild caustic, such as lactic acid, which is useful in these and similar cases.

CHRONIC SQUAMOUS ECZEMA.

The middle-aged woman before us has been under observation for several years, at intervals of from one to six months; consequently the treatment has been interrupted. The disease is chronic squamous eczema of the scalp, face, and neck. The skin is still much thickened, and on the face and neck is almost leathery. The process is chronic and inactive. She has been using latterly an alcoholic tarry lotion which benefits but does not cure. She will be ordered an ointment composed as follows:

R Acid. salicylici, gr. xv;
Hydrarg. chlorid. mitis, gr. xxx;
Picis liquidæ, fʒi;
Adipis, ʒi.

The patient, though of large frame, is ill-nourished and anæmic, and will doubtless be benefited by small doses of iron and arsenic. The bowels will be kept open by salts, used two or three times a week, taken before breakfast. The saline laxatives are preferable to other kinds.

ACNE ROSACEA.

Another woman presents herself, with a reddened state of the nose and cheeks, manifestly chronic, which, from the dilated capillaries and the presence of acne papules, we recognize as acne rosacea. The patient is middle-aged, spare, anæmic, and dyspeptic. The disease has existed for several years. Local treatment may prove sufficient to cure, provided the remedies be properly applied, for success in such cases of acne rosacea depends a good deal on the method of application as well as upon the strength of the preparations. In rebellious cases, too, it is well to change the remedies as soon as they cease to benefit. A lotion will be prescribed prepared as follow:

R Zinci sulphat.,
Potas. sulphid., aa gr. xxx;
Aquæ, fʒiv.
M. Ft. sol.

This is to be daubed on the parts for fifteen minutes twice daily. Every other day this is to be omitted, and an ointment of sulphur, from one to two drachms to the ounce, applied. Later, Vlemingkr's solution (of sulphurated lime) may be substituted for the lotion just mentioned, to be diluted with from six to two parts of water. Slight

desquamation should be set up by this remedy. Properly employed it is one of the most useful preparations we have for the disease. When over-stimulation occurs, from whatsoever remedy is being used, the skin should be given time to recover. On such occasions the several soothing ointments valuable in acute vesicular eczema, as, for example, boric acid or oxide of zinc ointments, may be employed with advantage; or, if lotions be required, one containing boric acid, than which nothing is likely to prove more soothing to a skin irritated from such a cause.

Otology.

ACUTE INFLAMMATION OF THE MIDDLE EAR: CATARRHAL AND PURULENT.

CLINICAL LECTURE DELIVERED AT THE WOMAN'S HOSPITAL, PHILADELPHIA.

BY CHARLES H. BURNETT, A.M., M.D.,

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on Otology in the Woman's Medical College of Pennsylvania; Aural
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THE middle ear is composed of the Eustachian tube, the tympanic cavity, and the mastoid antrum and cells. In acute inflammation of the middle ear it is usually only the Eustachian tube and drum-cavity which are affected, the mastoid cells being rarely implicated in the *acute* process.

I shall, therefore, consider chiefly inflammation of the drum-cavity arising from inflammation in the naso-pharynx and Eustachian tube. Acute inflammation may be set up in the drum-cavity by irritation entering from the external auditory canal and through the membrana tympani. But this source of tympanic inflammation is very rare. The usual source of acute inflammation in the drum-cavity is from inflammation in the nares and naso-pharynx, involving the mouth of one or both Eustachian tubes, and then affecting the middle ear by direct transmission up the Eustachian tube or by a reflex mode of progression to that sensitive region. Disease of the fauces alone has very little to do with the causation of aural disease of any form.

Acute inflammation of the middle ear is divisible into two very distinct and important forms,—viz., the catarrhal and the purulent.

By a *catarrhal* inflammation is meant one characterized by the formation of a mucous, muco-serous, or even muco-purulent secretion from the mucous lining of the drum-cavity, often affecting both ears, and frequently unattended with perforation; while by *purulent* inflammation is meant one characterized by more violent symptoms, the formation of pus in the cavity of the tympanum and extensive destruction in the

membrana tympani, usually affecting only one ear. Let us first consider the catarrhal form.

Diseases of the middle ear are the most frequent and among the most dangerous diseases to which man is liable. Most diseases of the middle ear begin as acute catarrhs of that space, and hence challenge our most serious attention. The simplest form of catarrhal inflammation of the middle ear is the stuffed sensation in one or both ears, experienced with a cold in the head. The naso-pharynx, be it remembered, is very rich in blood-vessels and glandular tissue. Lying between the mouths of the Eustachian tubes, there is in many individuals a rich glandular territory, resembling somewhat the tonsils, and hence called the pharyngeal tonsil by Luschka. The nares are richly supplied with blood-vessels in the erectile tissue over the turbinated bones. During a coryza all of these nasal and naso-pharyngeal structures become engorged and directly transmit inflammation to the Eustachian tubes or press upon their mouths, which, in a mechanical sense, amounts to nearly the same thing. The swollen state of the naso-pharynx at least induces a stasis near the Eustachian tubes, and thus maintains an irritation in this delicate and important region. Unimpeded nasal respiration and unimpeded aeration of the Eustachian tube are absolutely necessary to the maintenance of a normal condition of the ear. Now, the first occurrence in a cold in the head is impeded nasal respiration and aeration of the naso-pharynx, Eustachian tube, and middle ear. Hence every one with a cold in the head is in reality in the first stages of an acute catarrhal otitis media, because of the impediments just named. In many cases the stuffed feeling in the ears, and even some dull pain, pass off in a few days by spontaneous resolution. In many other instances this fortunate termination of the aural affection does not take place, but the stuffed sensation felt in the early stages of the coryza increases rapidly, perhaps in both ears. The patient's own voice sounds hollow to himself, as autophony has been set up. The latter symptom may be succeeded by a positive dulness of hearing for objective sounds, and at the same time more or less tinnitus aurium sets in, much to the patient's discomfort. The pain in the ear may become severe in catarrhal otitis media, but rarely as severe as in the purulent form. Coughing, sneezing, and eructation become more or less painful in the earlier stages before secretion occurs. Finally, when secretion has formed in the ear, the patient may experience vertigo, from the distention of the drum-cavity with the products of inflammation. The latter, pressing upon the fenestræ on the inner tympanic-wall, compromise the labyrinth-space and the fluid contained in it. This in turn,

pressing upon the nerve-filaments in the ampullæ of the semicircular canals, induces vertigo and disturbed equilibrium. Sometimes this is severe enough to cause nausea and vomiting.

If the *membrana tympani* of a patient thus affected be examined at the outset of the inflammation, it will appear dulled in lustre and reddened in the region of the *membrana flaccida*, around the periphery and down the handle of the malleus. Gradually, in severe cases, this redness may extend over the entire membrane, and the whole surface looks rough and flattened, but not retracted. As secretion accumulates behind the *membrana*, the latter may bulge outward, if the matter in the drum-cavity be thick and copious; if it is thin and not very copious, it is pushed inward by the *membrana*, which now becomes retracted from the absorption of air from the tympanic cavity. This disturbed equilibrium in atmospheric pressure on the inner side of the *membrana* enables the outer air to press the drum-head inward, and thus the retraction of the latter takes place. If the membrane is not thickened nor greatly congested, when the fluid is thin, it may be seen behind the *membrana*, and, if air is then forced into the drum-cavity through the Eustachian tube, bubbles may be seen in this fluid behind the drum-membrane. The latter will assume a nearly normal position after inflation.

At this point, in a purely catarrhal otitis media, the inflammatory process advances no further and suppuration is not reached. The pain ceases, the hissing tinnitus and the dulness of hearing with autophony remain, and the patient may experience some dizziness when walking. At the same time the process in the nares and naso-pharynx will have been arrested, and the discomforts of the patient at least do not increase. The *membrana tympani* may rupture spontaneously, and an escape of mucus take place. The spontaneous perforation may occur at any portion of the horseshoe zone lying between the periphery and the manubrium of the malleus, and running from the antero-superior quadrant to the postero-superior quadrant of the *membrana*. The spot most favorable to drainage is the postero-inferior quadrant. In most instances, as soon as the drum-cavity has thus emptied itself and the inflammatory process subsided, the perforation will close spontaneously, in some cases remaining open only a few hours. In others the perforation may close after the ear has discharged for a few days.

In the majority of cases of acute catarrhal otitis media the drum membrane does not spontaneously open. The pain is usually of a light character and short duration, ceasing as secretion takes place. The *membrana* rarely in these cases loses its translucency, so that the mucus

behind it cannot be seen. If the attack is not the first, the membrana may be thickened from the previous disease, and even if mucus is behind the membrane, in the drum-cavity, it cannot always be readily seen, unless it be in large quantity and yellow or reddish in color. If the entire cavity is not full, the surface of the fluid in the drum-cavity can be seen as a dark line running horizontally across the membrana tympani about half-way up or higher, near the short process of the hammer-bone. After inflation this line may be broken up into bubbles, or the force of the inflation may scatter the fluid away into the deeper recesses of the middle ear and mastoid antrum. The fluid in such cases is nearly transparent and amber-colored, unless there is considerable admixture of blood, when, of course, it will be reddish. In acute catarrhal cases the membrana tympani, after secretion has occurred, is much more likely to be retracted than bulging; the latter being observed only in the more severe cases bordering on, if not quite reaching, the purulent form. The auricle is not sensitive to touch, nor is the mastoid apt to be sensitive to pressure, in an ordinary case of acute catarrhal otitis media.

It becomes apparent to one who has observed much ear-disease that there is in acute catarrhal otitis media a tendency to spontaneous arrest, and in some instances to spontaneous resolution and return to a normal condition, if the subject is in fair health, and the process is not modified by any epidemic influence as in *grippe*, or by blood-poison as in syphilis or malarial diseases. It therefore becomes the duty of the physician at least not to hinder this desirable result by injudicious management, but to favor it by careful hygiene and cautious treatment.

As acute catarrh of the middle ear is always the result of acute coryza, the attention at first may be turned to the nares and nasopharynx in such cases, the treatment in every such instance being modified by the fact that the ears are implicated.

Treatment.—First let us consider the constitutional treatment in a case of acute catarrh of the naso-pharynx. When any one has taken cold, it is usually regarded as a trivial matter by both the subject and his friends. Self-treatment is, at best, all that is done for it, and here, if the ear is implicated, grave mistakes are often made. For instance, large doses of quinine are taken, ten to fifteen grains being swallowed at once or within a short time. This drug, like salicylic acid, has in such doses a very quick and decided tendency to congest the head and, with it, the entire auditory apparatus, from the drum-head to the labyrinth and auditory nerve. As the ear is already greatly congested, or absolutely inflamed, if the otitis is fully established, it is very plain

that quinine, in anything but very small doses, is contraindicated. Fifteen grains of quinine or salicylic acid at a dose, given to a cat, will disorganize the nerve-filaments in its internal ear. Hence a large dose of quinine or salicylic acid given to a man suffering from acute catarrhal otitis media may inflict, and doubtless has inflicted in many cases, an irreparable injury to hearing, by further congesting the middle ear and disturbing its nutrition. The same kind of action is exerted on the internal ear in similar cases, and unalterable changes thus suddenly brought about in the auditory nerve, inducing permanent defects in hearing. If quinine or salicylic acid must be administered in such cases, let the doses be moderate and carefully watched.

Another mistake is often made in the local treatment of the nares, the naso-pharynx, and sometimes of the ear itself. For many years it has been a custom for patients to resort to the use of the nasal douche—called in this country and in England Thudichum's douche—whenever they have a cold in the head. I regret to say that the people have been taught by physicians to resort to this instrument, which I am sure has done much more harm than good in the world when used as a surgical measure. It was devised originally by Weber for his physiological studies. The pernicious effects of this instrument are due to the fact that often cold water has been used in it, and a current of this passed through one naris, back into the naso-pharynx, and out of the other naris. The chilling effects of such an application are sufficient to menace and often interfere with the welfare of the middle ears. If the pressure of the current is increased by elevating the reservoir above the head, as has often been done, the fluid is forced into the Eustachian tubes and the middle ears, and an otitis set up, or aggravated if already present.

Then, too, there is a long list of so-called catarrh-remedies, both liquid and in powders, devised and advertised by ignorant and irresponsible persons. These are often resorted to during colds to excite sneezing, with a view to "breaking up the cold," as it is falsely termed. Sneezing should really be suppressed most carefully in the early stages of a cold in the head, as it only tends to irritate and further congest the nares, the naso-pharynx, and the middle ears. I have known some of these advertised liquid nostrums to be drawn forcibly into the nares, and even into the Eustachian tube, where they have set up a fierce inflammation and pain in the middle-ear cavity.

Then the numerous domestic and popular remedies for earache and other aural symptoms! They are all bad, and many harmful. *Nothing* should be dropped or poured into the external auditory canal and upon

the membrana tympani in acute otitis media, especially if there is any attendant myringitis, as there often is. All such applications to the ear increase the pain and make matters worse. Even warm water cannot be endured in an ear much inflamed, simply on account of its mechanical pressure on the drum-head.

But let us suppose that the patient with a severe cold in the head begins to show some of the symptoms of catarrhal otitis media, just alluded to, and applies at once for medical advice. The constitutional treatment should, of course, be a mildly antiphlogistic one; caution, as already stated, being observed in the administration of quinine. In fact, I think in an ordinary case of cold in the head, with or without ear-symptoms, uncomplicated by a malarial taint, quinine is contra-indicated, as it tends to further congest the head; small doses of aconite (one-tenth of a grain of alcoholic extract, U. S. P.) or phenacetin (five grains) being preferable, if the patient is an adult. If a child, sweet spirits of nitre or aconite may be given in doses suited to the age. With the first aural symptoms the patient should at least stay in his room, but not in bed, unless the febrile symptoms should be pronounced, because a recumbent position at first may aggravate the aural symptoms.

The diet should be light, and no alcoholic drink of any kind should be used. One of the greatest popular fallacies is the one leading patients to "feed a cold." Stimulating food increases the congestion of the head and renders all the nasal and aural symptoms worse. One of the evils of the quinine treatment in these cases is the increase of the appetite induced by it, and the consequent tendency of the patient to overeat.

The nares may be moderately sprayed by a hand-atomizer with solutions of salt-and-water (about three or four grains to the fluidounce) or with Dobell's solution. After the aqueous spray it will be well to spray the nares and naso-pharynx with albolene, fluid cosmoline, or glycolene. The latter oleaginous liquid is preferable, and it may contain a drop or two of eucalyptol to each fluidounce, or a grain or two of menthol. The spray should not be used further than to cause it to just reach the fauces, as the naso-pharynx should not be flooded unless there is a large quantity of secretæ to be removed, as in fevers.

If there is pain in the ear, it may be best relieved by the application of *dry heat* over the ear, or close in front of it on the cheek. This can be done most conveniently, in any place, by a flat four-ounce bottle filled with very hot water. I have seen children wakened by the pain of a catarrhal otitis relieved by this simple method in a short

time, and soon fall asleep. Had any of the hundred and one foolish remedies for dropping or putting into the aching ear been resorted to, the pain would certainly have been made worse, as I have seen. It is needless to specify any of these domestic remedies for earache. They are all bad, as in fact are all local remedies in the ear, for the cure of earache. The mere mechanical pressure of the instilled substance is sufficient in most cases to increase the pain, and many of them induce a myringitis, or make it worse if already established, and add to the distress of the patient already suffering with inflammation in the drum-cavity.

Dry heat may be applied to the affected ear also by the hot-water bag, a hot salt-bag, or a hot stone or brick wrapped in flannel. A very good and elegant way to accomplish the same thing is by the employment of the small metallic box, the Japanese "kairo," heated by means of fuses prepared for the purpose. I have found that the heat is intensified in these kairos by lighting both ends of the fuse, which gives a most comforting warmth for local application, lasting nearly two hours without renewal of the fuse. These boxes, with a pack of fuses, can be procured in any drug-store for the sum of twenty-five cents.

If none of these simple methods and applications relieve the earache, resort must be had to purely surgical means. The patient and his friends can do nothing more without direction from some one who can make an examination of the ear and diagnosticate accurately the exact nature and stage of inflammation.

It may be that a puncture with a paracentesis-needle in the deeply-congested *membrana flaccida* is demanded as the only remedy for the pain, or an incision elsewhere in the red and swollen or bulging membrane is required. The local depletion following such punctures and incisions is often sufficient to cut short inflammation and pain, if the former is not too deeply seated in the middle ear. In the latter instance, the pain will continue after the local depletion by paracentesis, and leeching may be demanded to prevent suppuration in the middle ear. One or two Swedish leeches may be placed in front of the tragus or beneath the ear, but never in the concha nor meatus externus of the auditory canal. It has never seemed to me that leeching on the mastoid influenced the otitis media. Three or four ounces of blood may thus be taken, sometimes with relief and benefit.

In the early stages of earache from acute catarrhal otitis media, inflation of the tympanic cavity, if done gently, will open the cavity, diminish the inward pressure of the *membrana tympani*, by the admission of air to its inner surface and the reduction of the vacuum in

the drum-cavity, and stop the pain in the ear. Then with the cessation of the congestion in the nares and naso-pharynx the ear will cease aching, and the patient will become comparatively comfortable.

The tympanic cavity may be inflated by Valsalva's or Politzer's method or by the Eustachian catheter. As the latter mode is applicable only to chronic cases in adults, we have here to consider only Valsalva's and Politzer's method. The former consists in the patient holding his nose and forcing air into the naso-pharynx and Eustachian tube. Children do not do this easily, and some adults entirely fail to do it. Politzer's method is much more generally applicable and successful. It consists in letting the patient swallow a little water at command, and in that moment, as the anterior wall of the Eustachian tube is drawn away from the posterior, if the air-bag arranged for this purpose is squeezed while the nose-piece is in the naris, air enters the tympanic cavity. (Fig. 1.) Instead of swallowing water, if the patient distends his cheeks with his breath, after the method of Holt, of Portland, Maine, air can be just as easily thrown into the middle ear as when the patient swallows, and in many cases more conveniently and agreeably, especially in children. Great care must be exercised to do this very gently in acute cases, as it may give pain even when gently applied. After the air-bag is emptied the surgeon must retain his grip on the hand-bag till the nose-piece is removed from the nose and washed. If the air-bag is allowed to fill itself again while the nose-piece is in the nose, or even before it is washed, secretions from the nose will be drawn into it, to be thrown into some other nose, with all the risks of conveying septic or infectious matter.

FIG. 1.



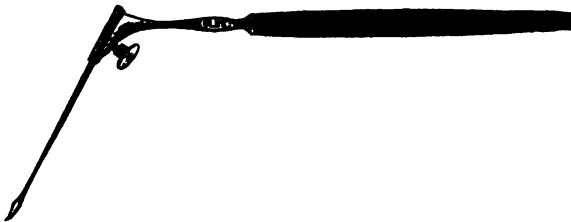
Application of the inflation-bag.

Finally, the symptoms of the cold in the head begin to subside, and would soon be forgotten were it not for the full feeling remaining in the ear or ears, the dulness of hearing, the tinnitus, and the autophony. The patient in fact, did he but know it, has reached a very critical point in his disease, so far as pertains to the welfare of his ears and hearing. Unfortunately, the discomfort is comparatively so slight, and the desire to resume the active duties of life so great, that the ears are neglected, the remaining discomforts being endured in the hope that they will soon disappear spontaneously.

If the membrana of such a patient be now examined, it will be found retracted, and, if not very thick, fluid will be seen behind it, as already described. In time this fluid may be absorbed, though my observations lead me to believe that, if absorption ever occurs, it takes place very slowly. The fluid is more likely to gelatinize and undergo a kind of organization into synechial bands, or engender a chronic catarrhal otitis, the most frequent and unmanageable cause of chronic deafness. If fluid is seen behind the membrana tympani, the latter must be incised, preferably at the lower posterior quadrant, and the fluid allowed or forced to escape.

With the fundus of the canal and the entire membrana tympani well illuminated by light from the forehead-mirror, or an electric lamp held on the forehead, an incision may be made with an aural paracentesis-knife, either in the most congested and protuberant spot on the

FIG. 2.



Paracentesis-knife. One-half natural size.

membrana or in the postero-inferior quadrant. In some cases incisions may be made at two places in the same membrane, one in the bulging part, if it exists, and the other in the postero-inferior quadrant, to further aid in drainage. Very often the fluid in the drum-cavity comes from the perforation very slowly or scantily. In such cases inflation of the tympanic cavity by Politzer's or Valsalva's method may be resorted to or aspiration with the pneumatic speculum of Siegele.

One such paracentesis and drainage of the drum-cavity will in

some few cases be sufficient. The incisions heal in a few hours at most, and the ear feels at once more comfortable, and the hearing becomes nearly if not quite normal. Frequently, however, more exudation occurs, and the drum-cavity is again filled, requiring another paracentesis. This may have to be repeated four or five times before exudation finally ceases. In the subacute form as many as thirty-six paracenteses have been required, extending over a period of two years or more, before the passive congestion and exudation in the middle ear ceased entirely.

Even in these long-continued exudations into the tympanic cavity, the hearing finally becomes nearly normal, and remains so indefinitely. In other cases of acute catarrh of the middle ear the organ never returns to an entirely normal state, but with the first attack there is laid the foundation of chronic catarrh of the middle ear, the most frequent cause of deafness.

ACUTE PURULENT INFLAMMATION OF THE MIDDLE EAR.

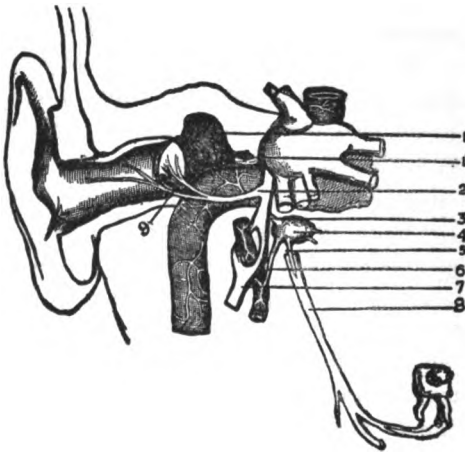
In many instances the acute catarrhal form of otitis media does not undergo spontaneous resolution, nor can it be relieved by any of the remedies I have described, but passes into acute otitis media purulenta. The pain in such cases will have defied all measures adopted for its relief, and terminates only when the membrana tympani ruptures spontaneously or is incised. When pus forms, it can be seen behind the membrana, causing the latter to bulge outward. It is this form of acute otitis media which causes the exceedingly distressing earache of children, in the very young inducing convulsions. In infants, teething or a coryza may bring on this form of aural inflammation, while in larger children and in adults the exanthemata, diphtheria, the continued fevers, or any febrile disease requiring recumbency, may induce purulent inflammation in the drum-cavity. The gravitation of secretions from the nares and mouth leads to their collection in the naso-pharynx, and decomposition near the mouths of the Eustachian tubes. The irritation thus set up becomes the cause of the purulent tympanic inflammation.

In some instances of severe cold in the head, as in *grippe*, it seems that the entire mucous tract, from the nares to the drum-cavity, and sometimes even in the mastoid antrum, leaps at once into an inflamed condition, resolving itself at last in purulency of the drum-cavity and mastoid antrum, with perforation of the membrana tympani. In the exanthemata and in *grippe* both ears are apt to be thus diseased at once, while in coryza one ear generally escapes the severity of purulency.

Other causes of acute purulent inflammation of the ear are exposure of the organ to inclement weather. In summer time prolonged exposure of the ear to the entrance of cold water in bathing or swimming, a rapid cooling of the heated body by lying on the ground or going into very cool places, like cellars or ice-houses, are all fruitful sources of purulent inflammation of the drum-cavity. It must be said, with regret, that many surgical operations in the nares and nasopharynx, for the relief of catarrh and obstruction of those parts, are followed by acute purulent otitis media. A more careful manipulation and antiseptics before and after the operation in the nares and nasopharynx would probably avert some of these accidents to the ears.

The mode of reflex action concerned in producing acute purulent otitis media, often observed in teething, demands careful consideration and remembrance. A goodly portion of the blood-supply of the membrana tympani comes from the tympanic branch of the internal

FIG. 8.



NERVOUS CONNECTION BETWEEN THE TEETH AND THE EAR. (Woakes).—1, tympanic cavity; 2, auricular branch of auriculo-temporal nerve; 3, branch from the ganglion furnishing vascular nerves to the internal carotid artery and its branch the tympanic artery; 4, otic ganglion; 5, branch from otic ganglion joining inferior dental nerve; 6, middle meningeal artery; 7, auriculo-temporal nerve; 8, inferior dental nerve to teeth and gums; 9, short tympanic branch of internal carotid artery.

carotid artery, which proceeds by a short course directly to its destination. This close connection with the large arterial trunk of the internal carotid renders the tympanic branch liable to a rapid augmentation of its supply of blood. The nervi vasorum of the carotid plexus at this point in its course come largely from the otic ganglion. On the other hand, the third branch of the fifth nerve, supplying the diseased gums and teeth, also communicates with the otic ganglion. Thus there is a direct channel of nerve-communication, through the otic ganglion, between the irritating

tooth or gum and the blood-supply of the membrana tympani. The effect of irritation in the teeth and gums, therefore, is to excite waves of vessel-dilatation in the correlated area,—viz., the membrana tympani. (Fig. 3.) Acute congestion is thus established in a sensitive and tense

tissue, causing intense pain. Prolonged irritation of this kind causes effusion into these tissues, passing into suppuration in many instances.

Owing to the free anastomosis of the vessels of the drum-head with those of the tympanic cavity, this region soon shares in the inflammatory process, and its cavity becomes filled with pus or mucopurulent fluid. This accumulated matter may escape by the Eustachian tube in children, as the tube is comparatively very large in them; or it ruptures the *membrana* and escapes through the external meatus. Before the discharge takes place the pent-up matter may press upon the fenestræ and thence upon the contents of the labyrinth, and excite convulsions. Before suppuration takes place in the drum-cavity in children inflammation may extend from the drum-cavity to the meninges of the brain, by the way of the petro-squamosal suture, through which a fold of dura mater dips into the tympanic cavity and connects with the muco-periosteal lining of the latter. This fissure is wide and the portion of dura mater entering the tympanum through it is large in infancy. Towards adult life this fissure becomes narrowed or obliterated, but the vascular connection between the drum-cavity and the brain continues. It is hence easy to understand how children may develop brain-disease and convulsions from the irritation originating in the teeth and gums and reflected to the ear. Unfortunately, the path of this reflected irritation to the brain is not recognized in many cases, and the patient is said by the doctor to have died of idiopathic brain-disease, while the laity say "the teething went to the child's brain." The latter statement is far more accurate than the former, as the occurrence of idiopathic inflammation of the brain is doubted by many careful observers.

Treatment.—Since acute purulent otitis media often begins as an acute catarrhal inflammation, the remedies already suggested for the latter may be employed for the relief of this disease at the outset,—viz., *dry* heat to the ear at first, with hot-water irrigation in the ear, and leeching in the most painful cases. But I cannot too strongly object to the use of all forms of poultices and hot drops composed of tinctures, acids, and what not, in this as in all aural diseases. By such procedure the ear is usually made worse, as an artificial inflammation of the skin in the auditory canal and of the *membrana* is excited and the original disease is masked. Unfortunately, this is very often the condition of the ear when the surgeon is first called to see the patient, because of the previous indiscriminate use of a host of senseless household or popular remedies. Examination of the *membrana tympani* now reveals a bulging of its surface, generally below the folds in the *membrana tensa*,

sometimes only in the *membrana flaccida* above the folds and short process. These two conditions are rarely found coexistent. Whenever bulging is found anywhere in the *membrana*, it is best to perform paracentesis at such a point. There are no "drops" which can relieve earache in children or adults.

When leeching seems indicated, as it may in those cases where the early symptoms are very severe, the leeches should be large, European ones, and applied three or four at a time. Two may be placed in front of the auricle at the base of the tragus, while one or two may be placed under and behind the lobule. Leeches should never be placed in the concha, meatus, or canal, as their bite at these points is painful and may excite boils or abscesses which will add to the patient's suffering. Five or six ounces of blood may be thus drawn, which will give great relief, and prevent suppuration if done soon enough. If natural leeches cannot be procured or seem undesirable, the artificial leech of Dr. Gorham Bacon will answer the purpose. Before the natural leech is applied the surgeon should mark the spots for the attachment of the leech, if the operation is to be done by a leecher. Before leeching near the ear the external auditory meatus should be stopped with cotton to prevent the accidental entrance of a leech into the auditory canal. Such an occurrence would cause most intense agony to the patient. In no case can leeching be done in infants or very young children.

The secretion collecting in the nares and naso-pharynx in any febrile disease should be most carefully removed by gentle spraying of these parts. This is best accomplished by spraying through the anterior nares and allowing the fluid thus thrown in to enter the naso-pharynx and soften, and thus remove the retained secretions and portions of food which may lodge there in a patient lying in bed. Dobell's solution or a simple solution of bicarbonate of sodium (five grains to the fluidounce of water with half a fluidrachm of glycerin) may be used in a hand-atomizer (the Magic, No. 2) for the spray. If the nares and naso-pharynx are thus kept clean in any case of fever, especially in the exanthemata and pneumonia, not only are the ears likely to be saved from an attack of purulent inflammation, with all its immediate depressing influence and ultimate disabling effects, but the general comfort of the patient is thus enhanced and one source of systemic irritation quite easily removed. Very few patients are too ill to co-operate with the surgeon in such a cleansing operation, especially after they have experienced the relief following antiseptic spraying and irrigation of their obstructed nares and naso-pharynx.

If dry heat and inflation, with leeches and hot irrigation in violent

cases, and treatment of the inflamed nares and naso-pharynx, give no relief, and if rest in bed or remaining in a warm room with antiphlogistic treatment also fail to stop the pain in the ear, only the escape of pus, either spontaneously or through the opening made by the surgeon's knife, will give the desired relief.

After the discharge of pus has set in, the ear must be gently mopped with absorbent cotton often enough to keep it clean and fairly dry. This mopping must be done gently and with due regard to the short auditory canal in children and the proximity of the drum-membrane to the meatus, and also to the sensitive nature of the cutaneous lining of the auditory canal and of the drum-head itself in both child and adult. Mopping is preferable to syringing, especially in children, if done by any one but the surgeon. The latter may syringe the running ear either with plain warm water, or warm water with a little salt in it (five grains to the fluidounce), or with a two-and-a-half-per-cent. solution of carbolic acid. This is quickly prepared by means of tablets,¹ one of which dissolved in a half-pint of warm water gives a solution of the desired strength. The ear may be syringed also with a bichloride solution (one to one thousand or one to two thousand, as desired), the solutions being prepared in the usual prompt way by means of the tablets. But all such syringing is to be done by the surgeon only. After the running ear is cleansed it may be mopped with solutions of yellow or blue pyoktanin. I have since last September used with advantage twenty-grain solutions of the former, and ten- and twenty-grain solutions of the latter. When all pain and soreness have left the ear, insufflation of boric acid, alone or in combination with some other drug, will be of use. In the more acute stages they are not well borne by the ear, as they cause pain.

The vast majority of such cases of acute purulent otitis media, as I have just described, will get well if properly treated, cleanliness and antiseptics being the foundation of the cure. It is even better to do nothing but clean the running ear with warm salt-and-water (five grains to the ounce) than to irritate it, as is, alas! too often done, by scraping and poking at the ear, and mopping and dropping into it anything of a stimulating or irritant nature. Many a case which would have gotten well of itself has been turned into a chronic otorrhœa by ignorant and meddling aural surgery. Then indeed has the patient's disease changed from one of a simple and manageable nature to one which entails discomforts and endangers his life.

¹ Such have been made for me by H. C. Blair's Sons.

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